Fair Play in Youth Football: Reducing Injury Rates Through Improved Sportsmanship Behavior

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Abstract

Sport participation is one of the leading causes of injury among American youth and poor sportsmanship behavior contributes to the risk of sport-related injury. Theories of behavior modification suggest operant conditioning can lead to behavior change, as can other environmental and personal factors. Additionally, models of sport-related injury show behavioral change can alter injury risk. One context injury prevention research should focus on is youth American football, as the competition injury rates are higher than those of other sports. The current study implemented modified Fair Play rules, which utilize operant conditioning, in a youth football league to determine if, compared to teams using standard rules, teams using Fair Play rules had (a) better sportsmanship behavior and attitudes and (b) lower injury rates; (c) if there was an effect, the study also aimed to determine how Fair Play rules impacted injury rates. These purposes were examined over two football seasons with one group of teams using Fair Play rules both seasons (FP-FP), one group using standard rules both seasons (Std-Std), and one group switching from standard to Fair Play rules after one season (Std-FP). At the beginning of this study, participants were on average 12.19 (±0.44) years old, Caucasian (85.1%), and male (99.4%).

Linear mixed models revealed the only statistically significant group difference for injury rates was a significantly higher rate of head/neck injuries for the FP-FP group than the Std-Std group when Fair Play penalty yards per game was not accounted for. Similarly, collapsing across groups, the rate of opponent head/neck injuries significantly increased after the first season, but no other changes over time were significant. A

MANOVA revealed no group differences in athlete self-reported sportsmanship behavior and attitudes or athletes' perceptions of coach sportsmanship behavior. High variability and small group sizes limited the power to detect differences, but examining mean values of injury rates revealed complex patterns across groups and time. Results suggest Fair Play rules and player sportsmanship behavior affect injury rates in youth American football; however, this effect is complex and further research is required to clearly determine the effect of Fair Play rules in this context.

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CHAPTER ONE

Introduction

Nearly 40 million youth participate in organized sport each year in the United States (Centers for Disease Control and Prevention, 2014; United States Census Bureau, 2014). Unfortunately, poor sportsmanship, typically defined as a set of attitudes and corresponding behavior that reflect a lack of responsibility, honesty, and respect for others (Shields & Bredemeier, 2007), is commonplace in youth sport, and poor sportsmanship behavior can put youth sport participants at greater risk for injury. Collins, Fields, and Comstock (2008) report that 6.4% of injuries sustained by high school athletes were the result of illegal activity. This speaks to the need to create youth sport atmospheres that promote good sportsmanship and admonish poor sportsmanship behavior to reduce injury risk. This is particularly true for youth contact sport athletes as injury rates in these sports, especially American football, far exceed injury rates of non-contact sports (Atay, 2014; Beachy & Rauh, 2014; Collins et al., 2008; Marar, McIlvain, Fields, & Comstock, 2012; Radelet, Lephart, Rubinstein, & Myers, 2002). In total, there are an estimated 2.6 million sport-related injuries that result in emergency room visits for athletes between the ages of 5–24 years, with the greatest number of these injuries being in youths between 5 and 18 years of age (Adirim & Cheng, 2003; Burt & Overpeck, 2001). Theisen, Malisoux, Siel, and Urhausen (2014) report that roughly 20% of youth sport injuries are categorized as "severe" because the athlete is held out of competition for at least four weeks following the injury. Additionally, there are an unknown, but

substantially larger number of injuries that are not documented or are managed outside of emergency departments.

These statistics underscore the significance of modifying sportsmanship behavior in youth sport. Bringing about behavior change in practically meaningful areas is a hallmark of Applied Behavior Analysis (ABA). Based on behavioral learning theories, ABA is a methodical approach to behavior change that has demonstrated its effectiveness in areas ranging from problem behavior in children with autism to exercise in aging adults (Roane, Ringdahl, & Falcomata, 2015). The key principles of ABA are that it is applied, behavioral, analytic, technological, conceptually systematic, effective, and generalizable (Baer, Wolf, & Risley, 1968). Though ABA has been implemented in sports settings as well, this has largely been limited to trying to improve skill acquisition and execution (Martin, Thompson, & Regehr, 2004) and researchers have yet to strictly adhere to the principles of ABA as a means to address poor sportsmanship behavior (possibly a result of the rigorous and labor-intensive nature of ABA).

While the focus of ABA lies primarily in behavior, social-cognitive theory emphasizes the importance of considering environmental contributions, psychological factors, behavior, and the interaction among the three in order to understand, and possibly modify behavior (Bandura, 1986, 1991). Behavioral interventions that have taken this social cognitive approach have often been combined with meaningful discussions of moral dilemmas akin to structural developmental theories of moral development (Haan, 1977; Haan, Aerts, & Cooper, 1985; Weiss, Smith, & Stuntz, 2008). However, these

interventions have been almost exclusively conducted in physical activity settings (e.g., Gibbons & Ebbeck, 1997; Gibbons, Ebbeck, & Weiss, 1995) and have not connected moral behavior in sport to sport-related injury.

Although research connecting moral behavior with injury reduction efforts has been limited, there has been a great deal of research into interventions designed to reduce sport-related injury rates, and conceptual models such as Verhagen, van Stralen, and van Mechelen's (2010) behavioral injury risk model provide insight into the role behavior may play. While many interventions hold promise, several rely on data from injury-related behavioral outcomes, such as wearing safety equipment, and fail to directly measure injury.

One particular rule modification intervention that has consistently demonstrated its effectiveness in reducing penalty and injury rates for youth ice hockey is Fair Play (Marcotte & Simard, 1993; Roberts, Dwyer-Brust, Leonard, & Hebert, 1996; A. M. Smith et al., 2009, 2015; A. M. Smith, Twardowski, Gaz, Margeneau, & Stuart, 2014). This program was originally conceptualized by Edmund Vaz when his research with child and adolescent ice hockey players led him to conclude that rewarding good sportsmanship would be an effective way to curtail violent behavior in ice hockey (Vaz, 1982). Fair Play rules incentivize good sportsmanship and playing within the rules of the game by awarding teams a point toward season standings for staying under a pre-set penalty limit during a competition. These rules have repeatedly been associated with reduction in both penalty (Marcotte & Simard, 1993; Roberts et al., 1996; A. M. Smith et

al., 2009) and injury rates (Roberts et al., 1996; A. M. Smith et al., 2016) in youth ice hockey. Despite these benefits, the research using Fair Play rules has several important limitations. For example, although this line of research is centered around the principles of operant conditioning, particularly the use of positive reinforcement for desirable behavior, aside from a recent commentary by A. M. Smith et al. (2013), the work has been conducted without discussion of the theoretical basis for the intervention or theoretical implications of the results. Additionally, programs that have used Fair Play rules have been reliant on only one indicator of sportsmanship (i.e., observed penalties) and limited to the sport of ice hockey.

Integrating this line of work with literature on youth sport injury surveillance, it is apparent that Fair Play rules should be modified for implementation in other sports. Youth American football appears to be an important next step for the Fair Play program, as competition injury rates for youth football are consistently higher than other sports that have been studied (Beachy & Rauh, 2014; Hootman, Dick, & Agel, 2007; Marar et al., 2012; Radelet et al., 2002; Rechel, Yard, & Comstock, 2008). In addition to game injury rates being higher, the current context of youth football in the United States is strikingly similar to that of youth ice hockey when the Fair Play program began (Marcotte & Simard, 1993). Concern about injuries, particularly concussions, and poor sportsmanship being modeled at the elite levels, such as the National Football League (NFL) and National Collegiate Athletic Association (NCAA) Division-1 football, have likely contributed to declining youth football registration rates nationwide. In fact, the National

Federation of State High School Associations participation data show that participation in American football during the 2014-2015 season was at its lowest point since 2005-2006 (NFHS, 2014, 2015).

Therefore, in the present study, Fair Play rules were modified for youth American football and systematically implemented in line with the principles of ABA. By doing so, the aim was to determine whether youth American football teams using Fair Play rules had better athlete sportsmanship behavior and lower injury rates than teams using standard rules. Additionally, this study provides a better understanding of the impact players' sportsmanship attitudes and perceived coach's sportsmanship behavior have on the Fair Play program's effectiveness.

The current study contributes to the literature in several important ways. First, the Fair Play intervention designed to reduce poor sportsmanship behavior in youth football was structured in a manner consistent with the principles of ABA. Furthermore, hypothesized consequences (i.e., reduced injury rates) of this behavioral change are theory-based (Verhagen et al.'s [2010] behavioral injury risk model). The current study also integrated the behaviorally-focused ABA approach to behavior change with social cognitive theory (Bandura, 1986) by investigating the role of personal (i.e., attitudes about sportsmanship behavior) and environmental (i.e., perceived coach's sportsmanship behavior) factors, as well as how these factors were affected by the behavioral intervention. Additionally, the literature for moral behavior and sports injury risk currently exist independently, but this study integrated the two related areas by

examining the effect of sportsmanship behavior on sport-related injury risk. Methodologically, the present study provides two critical advancements to existing research — a longitudinal design (lacking in much of the sport-related injury intervention research) and the presence of a control group (lacking in research on Fair Play rules). Moreover, the present study utilized both self-report and observational indicators of sportsmanship behavior, rather than relying exclusively on observed penalties as previous Fair Play literature has. Finally, the generalizability of the Fair Play program to a new context, youth American football, will be an important addition to the existing literature.

Review of Literature

The current study focused on an intervention designed to promote improvement in sportsmanship behavior. Therefore, the following sections will outline the methodological approach that was utilized, ABA, as well as literature on moral behavior in sport. Additionally, the literature on injury rates and interventions will be reviewed because hypothesized changes in sportsmanship behavior in the present study are believed to result in concomitant effects on injury rates in youth American football.

Applied Behavior Analysis

ABA is a systematic method of behavior change that is grounded in behavioral learning theories. Although often thought of as a procedure for working on behavioral issues associated with autism spectrum disorders and other developmental disorders (e.g., Howard, Stanislaw, Green, Sparkman, & Cohen, 2014), the ABA approach can be utilized to modify a wide range of behavior. For example, research and applied work

have demonstrated that ABA can be effectively implemented to bring about change with respect to education, safety behavior, obesity, general health and fitness, and many other areas (see Roane et al., 2015, for a detailed review of ABA-based research in a diverse array of fields). The seven key principles that underlie ABA, and likely contribute to its success, are that it is applied, behavioral, analytic, technological, conceptually systematic, effective, and generalizable (Baer et al., 1968). Interventions referred to as "ABA-based" capitalize on these seven principles. The following section will illustrate these principles using ABA-based research in sport, generally referred to as behavioral sport psychology — a field that began in the 1960s and was shaped by the early work of Brent Rushall, Daryl Siedentop, Thom McKenzie, Ronald Smith, and Frank Smoll (Martin & Thomson, 2011).

ABA principles in sport. The first principle of ABA, its applied nature, posits that the focus of behavior change is not chosen at random, but is a behavior with social significance and of importance to the individual performing the behavior. For example, proper tackling form in American football is an important skill that can reduce the risk of serious injury and permanent disability or death (Mello, Myers, Christian, Palmisciano, & Linakis, 2009; Mueller, 2001). For this reason, proper tackling form has been the focus of several ABA-based studies in the sport of American football at the adolescent (Allison & Ayllon, 1980), high school (Harrison & Pyles, 2013; Stokes, Luiselli, & Reed, 2010), and collegiate level (Ward & Carnes, 2002); each of these studies demonstrated improved tackling form following the intervention, but injury outcomes were not examined.

Additionally, ABA emphasizes the importance of directly observable behavior rather than self- or other-reporting of behavior. Establishing clear operational definitions of behavior is crucial for the success of an ABA program. In an intervention to improve blocking skills in 11–12-year-old "second string" American football players, Allison and Ayllon (1980) precisely defined what constitutes a correct block by outlining eight specific steps that must be executed by the athlete. For example, the fourth component stated, "the player must spring up, hitting the opposing player in the chest, shoulder pad to shoulder pad, with his head between the opposing player's head and the ball, and his arms must be folded into his chest" (Allison & Ayllon, 1980, p. 299). This explicit definition of an observable behavior allowed Allison and Ayllon (1980) to objectively demonstrate substantial improvement in tackling technique in each of their participants after implementing a behavioral intervention.

The analytic principle of ABA highlights the importance of clearly establishing a causal relation between the intervention and behavior of interest (Baer et al., 1968). Examples of ABA-based interventions, which could be provided individually or in combination with others, include explicit goal-setting, publicly charting performance, positive and negative reinforcement, and behavioral checklists. These interventions are provided within experimental designs that strengthen the connection between the intervention and behavioral outcomes, such as reversal and multiple-baseline designs. Each of these experimental designs begins with a baseline period during which the behavioral outcome is measured, followed by the intervention — provided at staggered

times across participants in multiple-baseline designs — and a second measuring of the behavioral outcome; in reversal designs, participants then return to the baseline condition and have the behavioral outcome measured once again (Roane, Ringdahl, Kelley, & Glover, 2011). This principle is also demonstrated in the youth American football study by Allison and Ayllon (1980), who implemented their blocking technique intervention with five athletes sequentially; in each case, blocking performance improved by nearly tenfold from pre-intervention levels. Allison and Ayllon (1980) also applied a reversal design for one of these athletes, which provided strong evidence for the intervention effect; this athlete's average of correctly executed blocks progressed from 8.3% during baseline to 48% during the intervention, down to 10% upon returning to baseline, and back up to 60% upon re-introducing the intervention.

With respect to the technological dimension, ABA dictates that all procedures involved in research and applied interventions be thoroughly described. To continue with Allison and Ayllon (1980), it was critically important that they explain their intervention in great detail in order to allow replication and evaluation of the intervention. The authors describe their program as a behavioral coaching intervention in which coaches were taught to instruct youth American football players how to successfully block by explaining the task, providing feedback in the moment, modeling correct form, and having the players repeat the demonstrated behavior. This technique differed from the coach's default method of periodic feedback, negative and demeaning remarks, punishment, and drill repetition. Each of the intervention components is described in rich

detail, as is the operational definition of a correct block, and the process of collecting data on skill execution (e.g., sets of 10 trials of a blocking drill).

The conceptually systematic aspect of ABA emphasizes the application of the well-established behavioral learning work of Ivan Pavlov, Edward Thorndike, and B. F. Skinner, namely classical and operant conditioning (e.g., Pavlov, 1927/1960; Skinner, 1938, 1953; Thorndike, 1927). Classical, or respondent, conditioning can be thought of as an antecedent-based approach to learning behavior. After repeatedly pairing a new stimulus with an existing stimulus-response pairing, the new stimulus will elicit the same response even in the absence of the original response-provoking stimulus. Operant conditioning, on the other hand, focuses primarily on consequences to explain learned behavior; behavior followed by reinforcement (e.g., an award, reduced pain) is more likely to occur in the future, whereas behavior resulting in a punishment (e.g., being yelled at, reduced playing time) is less likely to recur. These principles were clearly applied by Stokes et al. (2010) in their intervention with two high school American football athletes. In order to improve tackling mechanics, the athletes were awarded helmet stickers (i.e., positive reinforcement) for matching or exceeding their previous performance on a tackling drill (skill execution was evaluated using a 10-item checklist) that was part of their usual practice schedule. Coaches were also instructed to withhold negative statements if players missed a tackle. The stickers were highly valued rewards for the athletes, as they were typically restricted for rewarding exceptional performance during competitions and these particular athletes had yet to participate in a competition.

Both athletes in this intervention demonstrated clear improvements from baseline (average correct tackling form of 35% and 26%) to intervention (75% and 58%) performance, and this level of improved performance carried over to games as well (73% and 70%).

In order for an ABA-based intervention to be deemed effective, it must demonstrate a practically significant effect on the behavior of interest. This principle suggests that, in terms of ABA, the statistical significance of an intervention's effect on behavior carries less weight than the practical meaning of the change for the individual(s) of interest. For example, neither of the studies described above had enough participants to evaluate statistical significance, but dramatically improved execution of blocking and tackling skills had a meaningful impact on the athletes' abilities to effectively contribute as team members (Allison & Ayllon, 1980; Stokes et al., 2010).

The final dimension of ABA is that it is generalizable. This principle suggests that ABA-based interventions should not just change one behavior (the "target behavior") in one situation, but should promote improvements of the target behavior in other situations or changes in behavior associated with the target behavior. This principle was evident in S. L. Smith and Ward's (2006) intervention to improve task-specific behavior of three National College Athletic Association (NCAA) Division-II American football athletes. The researchers used goal setting, public posting of performance, and verbal feedback regarding practice performance to improve wide receivers' skills at blocking, route running, and releasing from the line of scrimmage. S. L. Smith and Ward (2006)

found a trend toward better execution of position-specific skills during practice; this effect on skill execution generalized to competition performance as well, even though the information on skill execution during competitions was not posted publicly.

As the examples provided above suggest, the majority of behavioral sport psychology research has focused on the areas of sport skill acquisition (e.g., learning proper tackling technique in American football as in Allison and Ayllon, 1980, Harrison and Pyles, 2013, Stokes et al., 2010, and Ward and Carnes, 2002) and performance enhancement (e.g., executing previously learned skills more accurately and consistently, as in S. L. Smith and Ward, 2006). In fact, a review of single-subject design studies (which predominate the field) from 1968 to 2003 found that 72% were focused in these two areas (Martin et al., 2004). The few group-based behavioral sport psychology interventions have also emphasized skill acquisition and execution. For example, Komaki and Barnett (1977) implemented a behavioral coaching intervention for a small group (n = 5) of youth football players to improve learning of specific plays (i.e., skill acquisition) and Ziegler (1987) implemented a stimulus cueing intervention for a larger group (n = 24) of novice tennis players to improve performance on forehand and backhand returns (i.e., performance enhancement). Despite addressing the behavior of several individuals at once, these interventions both resulted in substantial improvements in the targeted behavior.

Although behavioral sport psychology research has primarily focused on skill acquisition and execution, ABA can also be used to reduce the frequency of problem

behavior in sport. Using interventions such as public posting (Galvan & Ward, 1998; Hume, Martin, Gonzalez, Cracklin, & Genthon, 1985) and reinforcement (Allen, 1998; Hume & Crossman, 1992), researchers have demonstrated the effect of ABA for reducing disruptive behavior (Allen, 1998), off-task behavior (Hume & Crossman, 1992; Hume et al., 1985) and interference with other athletes (Hume & Crossman, 1992) among adolescent (ages twelve through sixteen years; Allen, 1998; Hume & Crossman, 1992; Hume et al., 1985) and collegiate (Galvan & Ward, 1998) athletes from a variety of sports (e.g., tennis, swimming, ice skating). Additionally, Galvan and Ward (1998) used a design similar to that of S. L. Smith and Ward (2006), utilizing feedback, goal setting, and public posting as interventions to reduce inappropriate behavior from collegiate tennis players. The inappropriate behavior targeted included verbal abuse (the most frequently occurring behavior), racket abuse, tennis ball abuse, and self-injurious behavior. The authors found significant reductions in inappropriate behavior once graphs of this behavior were posted in the locker room. Despite its demonstrated effectiveness in promoting behavioral change, few ABA-based interventions have focused on moral behavior in sport; the connection between moral behavior and sport-related injury (discussed in more detail below) make this an important extension to make.

Moral Behavior in Sport

Moral behavior in sport is often defined in terms of prosocial and antisocial behavior (Kavussanu & Boardley, 2009). Prosocial sport behavior includes voluntary actions aimed at affecting others in a positive way and could be demonstrated by assisting

an injured opponent and encouraging teammates (Eisenberg & Fabes, 1998). These actions, and more generally, acting responsibly and honestly and treating others with respect and encouragement exemplify good sportsmanship behavior. In contrast, antisocial behavior in sport includes voluntary actions aimed at hurting others or putting them at a disadvantage (Kavussanu, Seal, & Phillips, 2006). Examples of antisocial behavior in sport include intentionally breaking the rules, verbally abusing teammates, opponents, coaches, or officials, and trying to injure an opponent. Similarly, poor sportsmanship behavior would include these antisocial acts, but also selfishness and a lack of responsibility and honesty. Because of their importance for the current study, definitions of several related terms regarding moral behavior in sport are provided in Table 1.

The examples above highlight the broad nature of sportsmanship, which extends beyond the behavioral focus of ABA. Sportsmanship is considered a set of attitudes and the actions — both prosocial and antisocial — that result from those attitudes (Shields & Bredemeier, 2007). This definition suggests that evaluating sportsmanship attitudes is an important component in understanding sportsmanship behavior. It also appears that poor sportsmanship attitudes are common in youth sport in the United States, particularly in male athletes. Strand and Ziegler (2010) found that of 273 male and female high school athletes, 29% (42% of males) believed it was acceptable for an American football player to intentionally hurt an opponent as a means of intimidation, 22% (25% of males) said it

Table 1

Definitions Related to Moral Behavior in Sport

Term	Definition	Citation
Moral behavior	"a broad range of intentional acts that can result in positive or negative consequences for others"	Kavussanu & Boardley, 2012
Prosocial behavior	"voluntary behavior intended to help or benefit another individual"	Eisenberg & Fabes, 1998
Antisocial behavior	"voluntary behavior intended to harm or disadvantage another individual"	Kavussanu et al., 2006
Aggressive behavior	"voluntary behavior that has the intent to cause psychological or physical injury"	Shields & Bredemeier, 1995
Sportsmanship	"a set of attitudes and…behavior that gives expression to those attitudes"	Shields & Bredemeier, 2007
Gamesmanship	Attempting to distract or psychologically destabilize an opponent to gain an unfair advantage using strategies not covered by the written rules	Lee, Whitehead, & Ntoumanis, 2007
Moral development	"how character virtues, thoughts, and behaviors change over time as a result of cognitive maturity and social experiences"	Solomon, 2004

was acceptable for a basketball coach to teach players how to break the rules and not be seen by officials, 47% (53% of males) believed it was okay to not tell the official if there was a mistake in scoring the game-winning point in volleyball, and 18% (31% of males) approved of demeaning statements directed toward opponents after scoring. These data highlight a few problematic sportsmanship attitudes in high school athletes, but as theories such as social cognitive theory (Bandura, 1986) explain, these attitudes can influence sport behavior in meaningful ways.

Social cognitive theory. One of the most productive theories applied to

explaining human behavior is Bandura's social cognitive theory (Bandura, 1986, 1991). According to social cognitive theory, people learn behavior through direct experience or by observing the behavior of significant others and the corresponding consequences of those actions. The effect of direct learning of behavior is heavily dependent on the consequences; behavior that leads to favorable outcomes (i.e., reinforcement) is sustained, whereas behavior that is not met favorably (i.e., non-reinforcement or punishment) does not continue. However, social cognitive theory differs from ABA in that it states this effect on behavior is, at least in part, driven by our cognitive abilities. In other words, the consequences of our behavior also provide information about which actions are likely to lead to similar consequences in the future. Observational learning, or modeling, provides a route to learning behavior without risking the consequences of potentially disastrous behavior. Bandura states that this is the route in which we learn the majority of our behavior, and much like with direct learning of behavior, individual cognition about the behavior plays a crucial role. Rarely do humans observe a behavior, perform the behavior, and have this mimicry reinforced, creating an association between a stimulus and some modeled response; rather, humans observe a behavior, create a symbolic representation of that behavior, and perform the behavior at a later date. This cognitive explanation of observational learning is governed by one's ability to attend to the essential components of the modeled behavior, remember the behavior through a symbolic representation (either verbal or imaginal) and mental rehearsal, reproduce the modeled behavior, and whether or not the individual anticipates favorable consequences

from the behavior. From these descriptions of behavioral learning, a key component of social cognitive theory is apparent — there are reciprocal relations between personal attributes (such as cognitions and attitudes), environmental factors (such as external reinforcement and models), and an individual's behavior.

Social cognitive theory, and particularly Bandura's (1991) updated social cognitive theory of moral thought and action, provides a framework under which numerous determinants of sportsmanship behavior can be explained. Whereas ABA would isolate the effect of reinforcement contingencies on sportsmanship behavior, a social cognitive theory approach would also consider the impact of personal factors (such as sportsmanship attitudes) and other environmental influences (such as a coach's sportsmanship behavior). For example, a positive reinforcement-based intervention (an environmental influence) may fail to reduce poor sportsmanship behavior not because the reinforcement was incorrectly selected or implemented, but because coaches and other adults (environmental influences) were serving as models of poor sportsmanship behavior or because the athletes maintained attitudes that align with poor sportsmanship behavior (a personal influence). These personal and environmental influences are believed to act interdependently according to social cognitive theory (Bandura, 1986), with both accounting for similar amounts of behavioral variability (Fleeson, 2004; Fournier, Moskowitz, & Zuroff, 2008). The key features of both environmental and personal factors influencing moral behavior in sport will be addressed independently in the following sections.

Environmental factors relating to moral behavior in sport. According to social cognitive theory, one of the prominent ways in which we learn moral behavior in sport (positive or negative) is through modeling. Researchers have extended Bandura's early work on modeling of aggressive behavior (Bandura, Ross, & Ross, 1961) to sport contexts and demonstrated the role that coaches (Guivernau & Duda, 2002; Shields, LaVoi, Bredemeier, & Power, 2007), parents (Arthur-Banning, Wells, Baker, & Hegreness, 2009; Guivernau & Duda, 2002), and other athletes (Guivernau & Duda, 2002; Mugno & Feltz, 1985; M. D. Smith, 1974, 1978; Stephens 2000, 2001, Stephens & Bredemeier, 1996; Stephens & Kavanagh, 2003) play in providing observational learning opportunities for young athletes to develop moral behavior in sport, both positive and negative. Illustrating this point, Shields et al. (2007) found that perceived behavior of coaches and spectators had the strongest associations with self-reported poor sportsmanship behavior in a large sample of male and female youth athletes from a variety of sports; other significant predictors included sportsmanship attitudes, team norms for poor sportsmanship behavior, and the perceived norms of coaches and parents.

Additionally, the behavior and attitudes of significant others in a situation can promote a performance motivational climate for a team — typically supplemented by a coach prioritizing winning over other benefits of sport participation (e.g., moral development, life skills) and focusing reinforcement on behavior that positively affects the competitive outcome (Ames, 1992). This "win at all costs" mentality is in stark contrast to a mastery motivational climate, which emphasizes personal growth and

development, and further influences an individual's judgment of moral situations and behavioral intentions (e.g., Stephens, 2000, Stephens & Bredemeier, 1996). A series of studies by Ommundsen and colleagues (Miller, Roberts, & Ommundsen, 2004, 2005; Ommundsen, Roberts, Lemyre, & Treasure, 2003; Stornes & Ommundsen, 2004) has shown that a performance motivational climate is related to several moral outcomes including team norms that support aggressive behavior, lower levels of respect for officials, rules, and sport conventions, and self-reported unsportsmanlike behavior. However, the direct effect of motivational climate on athlete moral behavior has not been found consistently, leading other researchers to suggest motivational climate exerts its influence indirectly, through athletes' moral functioning and their perception of how legitimate unsportsmanlike behavior is (Kavussanu, Roberts, & Ntoumanis, 2002).

As the work of Kavussanu et al. (2002), Miller et al. (2005), and numerous other researchers (Guivernau & Duda, 2002; Long, Pantaléon, Bruant, & d'Arripe-Longueville, 2006; Stephens, 2000, 2001; Stephens & Bredemeier, 1996; Stephens, Bredemeier, & Shields, 1997) shows, poor sportsmanship displayed and endorsed by coaches and teammates not only provides a model of this behavior for other athletes, but it can create a moral atmosphere in which poor sportsmanship, including antisocial behavior in sport, is considered normative. To illustrate this point, although mean values for self-reported aggressive behavior tend to be low, the behavior still exists, and the line of work by Stephens (2000, 2001; Stephens & Bredemeier, 1996; Stephens et al., 1997; Stephens & Kavanagh, 2003) has demonstrated that a team norm for aggression (belief that

teammates would intentionally hurt an opponent) is consistently associated with self-reported aggressive behavior.

Personal factors relating to moral behavior in sport. In addition to environmental influences on moral sport behavior, social cognitive theory suggests personal attributes, such as thoughts and attitudes, also play a role. These characteristics may directly influence moral judgment and decisions or moderate the interpretation of contextual factors and thus, their effect on moral behavior.

How important moral behavior is to an athlete, known as moral identity, is one personal factor that may operate in this context. Those with strong moral identities value moral behavior and consider it critical to who they are (Hart, Atkins, & Ford, 1998). Moral identity has been associated with moral behavior in various settings, such as salary negotiations (Aquino, Freeman, Reed, Lim, & Felps, 2009) and charitable donations (Aquino & Reed, 2002), but few have considered its role in sport. Among those who have, Kavussanu, Stanger, and Boardley (2013), demonstrated that athletes from a variety of team sports (ice hockey, netball, soccer, and rugby) with a stronger moral identity reported lower levels of antisocial behavior toward teammates and opponents and higher levels of prosocial behavior toward opponents than athletes with weaker moral identities. Kavussanu, Stanger, and Ring (2015) expanded these results by showing that athletes with a strong sense of moral identity are less likely to commit this antisocial behavior because of the guilt they expect to experience afterward, another personal contribution to moral behavior.

More specific attitudes about particular poor sportsmanship behavior can also influence how likely it is that poor sportsmanship behavior will occur. For example, although the mean values of poor sportsmanship behavior (self-report, predictions of teammates, and perceptions of coach/spectator) were low in their sample of American youth athletes (grades 5–8) from various sports, Shields et al. (2007) found that perceiving poor sportsmanship behavior as acceptable was still a significant predictor of self-reported poor sportsmanship behavior. In line with social cognitive theory, Shields et al. (2007) also found that environmental factors, including the poor sportsmanship behavior of coaches and team norms for poor sportsmanship, made significant contributions to the prediction of athletes' poor sportsmanship behavior. The components of social cognitive theory highlighted above provide strong foundations for the development of interventions aimed at improving moral behavior in sport.

Moral behavior in sport interventions. Many interventions targeting moral development and behavior take advantage of principles from social cognitive theory (e.g., modeling and reinforcement) as well as structural developmental theories (e.g., Haan, 1977; Haan et al., 1985). Structural developmental theories focus on the progression of moral reasoning from being more egocentric to considering greater ethical principles to guide behavior; a common strategy used in the structural developmental approach involves the discussion of moral dilemmas to identify solutions suitable to all parties ("dilemma, dialogue, and balance"; Weiss et al., 2008). Several researchers have used, or evaluated programs that use, these techniques and found positive results for moral

development (Bredemeier, Weiss, Shields, & Shewchuk, 1986; DeBusk & Hellison, 1989; Gibbons & Ebbeck, 1997; Gibbons et al., 1995). One prominent example of these is the Commission for Fair Play in Canada's *Fair Play for Kids* (1990) program.

Based on moral development research and theory, the Commission for Fair Play in Canada developed a series of educational activities for students in grades four through six. The structural developmental roots of the program are highlighted by activities involving perspective-taking and discussions of moral dilemmas in order to resolve conflicts. Furthermore, aspects of social cognitive theory were present as some activities involved observational learning (former Canadian Olympic athletes served as models) and students were rewarded for being "fair players" (positive reinforcement). The program activities were intended to promote respect for rules, officials, and opponents, provide equal participation opportunities to all students, and encourage self-control (*Fair Play for Kids*, 1990).

Students who were involved in *Fair Play for Kids* over the course of a seven-month academic year reported higher levels of moral judgment, reasoning, intention, and behavior than students in the control group (Gibbons et al., 1995). A follow-up study found that independent structural development and social cognitive programs were also superior to the control group in terms of moral judgment, intention, and behavior, with the structural development group also showing significantly higher moral reasoning than the control group (Gibbons & Ebbeck, 1997).

Other systematic programs, like the personal social responsibility model (Hellison

& Walsh, 2002) and positive youth development programs, such as *The First Tee* (Weiss, Stuntz, Bhalla, Bolter, & Price, 2013) and *Play it Smart* (Petitpas, Van Raalte, Cornelius, & Presbrey, 2004), have demonstrated their effectiveness for teaching interpersonal, emotional control, and prosocial behavior. These, and several other positive outcomes, have also been demonstrated to transfer to other life domains as well (Weiss et al., 2013). For example, Weiss, Bolter, and Kipp (2016) found that youth who participated in *The First Tee* scored significantly higher than youth who participated in other activities on several life skills (meeting and greeting, managing emotions, resolving conflicts, appreciating diversity, and getting help) and developmental outcomes (perceived academic competence, perceived behavioral conduct, responsibility, honesty, preference for challenging skills, and self-regulated learning); the development in these skills was also maintained, or enhanced, over a 3-year period.

Unfortunately, despite their effectiveness in physical activity settings, interventions driven primarily by social cognitive theory have rarely considered behavioral outcomes in sport, focusing instead on evaluating sportsmanship-related attitudes. This shortcoming limits conclusions that can be drawn about the practical value of such interventions and has prompted calls for researchers to pursue this line of work (e.g., Kavussanu, 2012). For example, *Play Hard, Play Fair, Play Fun* (Wells, Ellis, Paisley, & Arthur-Banning, 2005) is a social cognitive-based moral development program for youth basketball (grades 3-8). The specific situational interventions included strategies to keep scores close, create social pressure to play with good sportsmanship,

and increase personalization of opponents and officials. Additionally, coaches are taught to model good sportsmanship behavior and wear t-shirts that say “it’s only a game,” and teams meet for post-game socials and vote for the opponent who exemplified good sportsmanship — these players are given a certificate and prize in addition to the social reinforcement provided by the recognition. Wells et al. (2005) found that parents reported improvements in their children's sportsmanship attitudes after the program; however, this study had no control group or direct measures of moral judgment, reasoning, intention, or behavior. Fortunately, subsequent work by this group addressed these limitations and found that athletes in the program exhibited more positive sportsmanship behavior and less poor sportsmanship behavior than a control group (Wells et al., 2008).

The interventions reviewed above have practical significance that goes beyond moral development and sportsmanship, as one important consequence of antisocial behavior in sport is injury risk. Although moral development interventions have yet to address this extension, a significant portion of sport-related injuries are the result of illegal, aggressive behavior (Collins et al., 2008; Dick et al., 2007). Using 2005–2007 data from the National High School Sports-Related Injury Surveillance Study, Collins et al. (2008) estimated that 98,066 competition injuries (6.4% of all injuries) were the result of illegal activity. Additionally, Dick et al. (2007) found that one-third of above-the-neck injuries in collegiate women's field hockey occurred on a play in which a penalty was called. These findings suggest that interventions that reduce poor sportsmanship behavior

are likely to result in corresponding reductions in injury rates. Reducing sport-related injury risk is important in part because of the sheer number of people at risk; each year, tens of millions of American youth are at risk of sustaining an injury during sport participation.

Sport-Related Injury

Based on a recent estimate, 54.0% of high school students (59.6% for males and 48.5% for females) participated in at least one organized school- or community-based sports team in the previous 12 months (Centers for Disease Control and Prevention, 2014). This number represents over 16.5 million high school students involved in organized sport (United States Census Bureau, 2014). Considering sport participation declines with age, a 54% participation rate for youth ages 5-14 years would be a conservative estimate, resulting in an additional 22.2 million youth participating in sport. An important note about the 38.7 million participants is that it only takes into account those involved in organized youth sport, excluding millions more Americans who engage in informal neighborhood sporting opportunities. Unfortunately, suffering an injury is a risk inherent to sport participation; therefore, it is no surprise that sport-related injuries have been an area of interest for sport psychologists and health professional researchers for many years.

Injury rates, often expressed in terms of injuries per 1000 athlete exposures (AE; with one athlete participating in one game/practice for any amount of time representing 1 AE), are consistently higher in contact sports, especially youth American football, than

non-contact sports (Atay, 2014; Beachy & Rauh, 2014; Collins et al., 2008; Marar et al., 2012; Radelet et al., 2002). This effect is particularly true when focusing on injuries sustained during competition; for example, in middle school athletes, Beachy and Rauh (2014) found a game injury rate of 15.03/1000AE for football, with the next highest sports being boys' wrestling (7.60/1000AE) and girls' wrestling (3.21/1000AE) when only injuries treated by a certified athletic trainer were included. Similar results were reported in high school athletes by Collins et al. (2008; football: 12.80/1000AE; girls' soccer: 5.32/1000AE; boys' soccer: 4.26/1000AE). Using observational methods (in the absence of a certified athletic trainer), Radelet et al. (2002) found higher injury rates for athletes between the ages of 7 and 13 years (football: 43/1000AE; girls' soccer: 41/1000AE; boys' soccer: 26/1000AE).

Studies addressing football injuries in more detail have outlined a steady increase in injury rates as athletes age. For example, although Stuart, Morrey, Smith, Meis, and Ortiguera (2002) reported an overall game injury rate of 8.47/1000 player-games, this number ranged from 3.80/1000 player-games for 4th grade athletes to 15.45/1000 player-games for 8th grade athletes, all of whom participated in full-contact tackle football. Similarly, and also in full-contact tackle football, Malina et al. (2006) reported game injury rates of roughly 13.3/1000AE and 12.9/1000AE for combined fourth-fifth-grade and sixth-grade teams, respectively, but nearly twice that for seventh- (26.1/1000AE) and eighth-grade (27.4/1000AE) teams. Higher game injury rates in American football than other sports is a logical conclusion considering nearly every position on American

football teams requires forceful collisions with opponents (e.g., offensive players blocking, while defensive players fight blocks and tackle the ball-carrier). Radelet et al. (2002) highlighted the role of player contact in youth football injuries by showing that contact with equipment (often the ball) was the most common mechanism of injury for baseball, softball, and soccer, whereas contact with another player was the most common injury mechanism for football players. In their research, 58.8% of youth football injuries were the result of contact with another player compared to 40.3% for soccer, 11.8% for softball, and 4.3% for baseball.

Despite continued interest in sport-related injury, the complexity of the issue has precluded a consensus injury definition. For example, a recent systematic review of youth sport injury rates notes that injury definitions ranged from "minor discomfort that did not restrict further play" to "a 7-day absence from the sport" (Spinks & McClure, 2007, p. 22). Furthermore, while many researchers report injury rates, others rely on statistics regarding injury incidence (i.e., the number of new cases that occur over a specified period of time), which do not account for variability in exposure to injury risk. Additionally, when researchers do report injury rates, different values are often applied as the denominator of the injury rate value. In the studies reviewed above, injuries were reported per 1000 AEs, with 1 AE representing one athlete participating in one practice/game, or as injuries per 1000 player-games, with one player-game representing one active position in-play during a practice/game. To illustrate these differences, one American football game consists of two sets of 11 athletes competing at any given time,

resulting in a total of 22 player-games; however, if all 25 players from each time enter the game at some point, there would be 50 AEs. Other potential denominators of the injury rate include the total number of athletes (to show injuries per athlete per season), the total number of games/practices (to show injuries per game/practice), or even the total number of player-hours (to account for differences in playing time and show injuries per athlete-hour of exposure).

The most recent development in injury rate denominators is individual exposure time (e.g., Konopinski, Jones, & Johnson, 2012; A. M. Smith et al., 2014; Waldén, Hägglund, & Ekstrand, 2005). Individual Exposure Time (IET) allows researchers to calculate injury rates specific to each athlete by dividing the number of times they are injured by their time exposed to risk using game-clock time (in games or practice). This system is advantageous because, unlike other denominators of the injury risk equation, it does not assume all athletes play an equal amount of time and have an equal risk of sustaining an injury — these assumptions can result in overestimates of exposure, causing injury rates to be underestimated. In this way, IETs can allow researchers to account for athletes who are more "injury prone," engage in more risky behavior, and/or participate for more time (and thus may be more fatigued) than other athletes. Despite the many strengths of using IETs to evaluate injury risk, the data collection is expensive as it may require high quality video recording, data analysis is labor and time intensive, and the substitution patterns of some sports (e.g., American football) would make tracking IETs very difficult.

These definitional issues are reflected in the great deal of variability in reported injury rates across numerous sports and ages. Despite this, several models have been proposed to elucidate the mechanisms underlying injury risk; one such model, with an explicit focus on behavioral factors relating to sport-related injury risk, is Verhagen et al.'s (2010) behavioral injury risk model.

Behavioral injury risk model (Verhagen et al., 2010). Verhagen et al. (2010) focused a multitude of behavioral inputs that may contribute to injury risk and sport-related injury (see Figure 1). According to their conceptual model, the behavior of several actors in the sport and rehabilitation settings (athlete, coach, referee, physical therapist, etc.) can both directly and indirectly influence the risk of sport-related injury. Direct associations between a behavior and injury risk would include not wearing protective equipment or aggressive play. Indirect behavioral influences, on the other hand, are believed to exert their influence by modifying other injury risks; for example, poor rehabilitation adherence could result in sub-optimal injury recovery, putting an athlete at greater risk of re-injury upon return. Additionally, the interactions among the several potential behavioral influences should be considered, rather than addressing each component in isolation. Although not explicitly in the model, Verhagen et al. (2010) are consistent with the social cognitive framework outlined previously by accounting for the role of personal (e.g., age, attitudes, perceived social norm) and environmental factors (e.g., physical context); specifically, the authors suggest these factors influence the intent to perform a particular behavior.

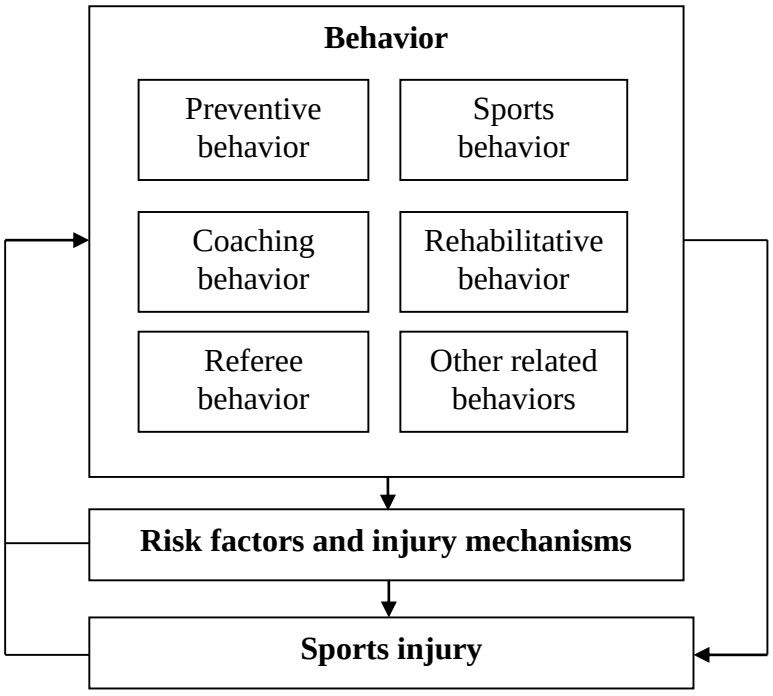

Figure 1. Behavioral injury risk model. Adapted from "Behavior, the key factor for sports injury prevention" by E. Verhagen, M. M. van Stralen, and W. van Mechelen, 2010, *Sports Medicine, 40*, p. 901. Copyright by Adis Data Information BV.

Therefore, Verhagen et al.'s (2010) behavioral injury risk model would predict that interventions modifying athlete sportsmanship behavior ("Sports behavior" in Figure 1) would result in changes to the risk of sustaining a sport-related injury. This model also addresses the fact that a coach's sportsmanship behavior ("Coaching behavior" in Figure 1) and an athlete's attitudes about sportsmanship could moderate the effect of sport-injury interventions that target behavioral change.

Sport-related injury interventions. Despite Verhagen et al.'s (2010) model, as well as several other high quality conceptual models of sport-related injury risk, most interventions designed to reduce injury risk proceed without considering theoretical

applications (McGlashan & Finch, 2010). These injury prevention strategies in youth sport have focused on four areas: (a) education (Barron et al., 2014; Cook, Cusimano, Tator, & Chipman, 2003), (b) safety equipment (Eime, Finch, Wolfe, Owen, & McCarty, 2005; Levy, Hawkes, & Rossie, 2007; Marshall, Mueller, Kirby, & Yang, 2003; Withnall, Shewchenko, Wonnacott, & Dvorak, 2005), (c) physical activity programs (Emery, Cassidy, & Klassen, 2005; Hewett, Ford, & Myer, 2006; McGuine & Keene, 2006; Thacker, Gilchrist, Stroup, & Kimsey, 2004), and (d) rule changes (Cusimano, Nastis, & Zuccaro, 2013; Veigel & Pleacher, 2008). Although there has been research on prevention efforts with collegiate athletes (e.g., Perna, Antoni, Baum, Gordon, & Schneiderman, 2003; Silvers-Granelli et al., 2015), much of the injury prevention research has concentrated on youth sport. This emphasis is potentially the result of the sheer number of young athletes involved and the relative difficulty of implementing interventions at higher levels of sport participation. The current review will focus on rule modification as a strategy to reduce injury rates in youth sport.

Modifying rules in an attempt to reduce injury rates was a logical extension from reports that a large portion of high school athlete injuries (up to 14% for girls' basketball) are the result of illegal play (Collins et al., 2008). Kerr et al. (2015) investigated the effect of a rule change (limits on practice contact for youth American football) in isolation and in combination with an educational intervention (e.g., proper fit for equipment, tackling technique, injury and illness signs). The authors found that the multimodal intervention group had significantly lower practice and game injury rates

than a control group and a significantly lower game injury rate than the education only group. An additional rule modification program that has received considerable research attention in youth ice hockey is Fair Play.

Fair Play rules modification. Edmund Vaz's research with youth ice hockey players led him to conclude that some coaches were explicitly teaching illegal and aggressive behavior (Vaz, 1982). This was being done as a means of conveying the normative informal control system, and as players age, these illegitimate acts are seen as more tactically functional. Further, he believed that rewarding good sportsmanship was the vehicle through which violent behavior in ice hockey could be curtailed. Based on this premise, Vaz created an outcome system in which teams earned points toward season standings based not only on the competitive outcome of a game, but also on how well the team conforms to the rules of the game (based on penalties incurred).

Vaz's (1982) proposed revision to the scoring structure for ice hockey contests was not adopted by leagues or empirically evaluated for several years. However, its potential to result in less aggressive and dangerous competitive behavior sparked interest from researchers once youth ice hockey registration rates in Canada had been on a steady decline for over a decade. This decline was attributed to professional athletes consistently modeling aggressive behavior and parental concern about injury risk in youth ice hockey (Marcotte & Simard, 1993). Marcotte and Simard (1993) believed that Vaz's system, now titled "Fair Play," could be an effective way to alleviate injury concerns and curb the registration decline. In their comparative study of youth ice

hockey teams (aged 11-14 years), some teams were awarded a Fair Play point for committing fewer than a pre-determined number of penalties in a game (with the limit being adjusted for each age group). These Fair Play points worked in conjunction with the standard point scoring system (i.e., two points for a win, one point for a tie, zero points for a loss) to determine league standings. By the end of the season, the teams playing under Fair Play rules committed substantially fewer major penalties and had fewer suspensions than teams operating under standard rules, both indicators of improved sportsmanship behavior. Not only did Fair Play rules reduce poor sportsmanship, but the registration rates for subsequent seasons suggest the program may have also helped slow the mass exodus of participants from Canadian youth ice hockey.

Roberts et al. (1996) took advantage of a slightly modified version of the Fair Play rule system in place for part of a 3-day Junior Gold (athletes currently enrolled in high school and under 20 years of age) ice hockey tournament. In addition to earning points for competitive outcomes, teams in this tournament were rewarded, or penalized, for the number of penalties committed (Fair Play points), shots taken on goal, preventing the other team from scoring, and winning an individual period. Games in which Fair Play rules were in effect had fewer penalty rates even at this higher competitive level; however, in the championship round games, when Fair Play rules were no longer in effect, teams committed nearly twice as many penalties and four times as many major penalties as they did during the qualifying rounds. This design is similar to ABA studies that use a reversal design and provides strong evidence for the effectiveness of the Fair

Play intervention. However, inherent differences between qualifying rounds and championship rounds of competition, as well as differences in the teams involved and level of fatigue in each of the rounds weakened the comparison of penalty rates between the qualifying and championship round games.

A. M. Smith et al. (A. M. Smith et al., 2009; A. M. Smith et al., 2014; A. M. Smith et al., 2016) have since developed a systematic line of research on Fair Play rules in youth ice hockey. Their first use of this program was as part of a multimodal Hockey Education Program (A. M. Smith et al., 2009) that also targeted player skill development and educating coaches to promote a positive context for the development of young athletes. Rather than a total number of penalties, A. M. Smith and colleagues' (A. M. Smith et al., 2009; A. M. Smith et al., 2014; A. M. Smith et al., 2016), use of Fair Play rules specified an allowable number of penalty minutes for each game — this modification resulted in major penalties (which are more likely to contribute to injury risk) having a larger impact on the team's ability to earn their Fair Play point. For example, if teams are only permitted 14 penalty minutes per game, a 5-minute major penalty is considerably more impactful than a 2-minute minor penalty. Additionally, to hold all parties accountable for the overall sportsmanship atmosphere, teams would also forfeit their Fair Play point if a coach or fan was ejected from a game. In their initial evaluation of the broader HEP program, A. M. Smith et al. (2009) found results that paralleled those of other Fair Play researchers — there were fewer penalties and higher registration rates once Fair Play rules were in effect. This evaluation advanced the Fair

Play literature by providing insight into which specific penalties were most affected by Fair Play rules. After one season of using Fair Play rules, all age groups showed decreased levels of minor (e.g., high sticking), major (e.g., fighting), and other penalties. Two of the most dangerous penalties, checking from behind and head contact penalties, also decreased each season. Unfortunately, analyses in subsequent seasons revealed that both the minor and major penalty rates had dramatically increased even though Fair Play rules were still in place (A. M. Smith et al., 2014). The rise in major penalties appeared to be driven by an increase in checking from behind and head contact penalties, possibly a result of officials emphasizing enforcement of these penalties.

Despite the generally positive results in terms of the effect of Fair Play rules on penalty and registration rates, until recently only the early work by Roberts et al. (1996) examined the program's effect on injury rates. In that study, Roberts et al. found that the rate of "notable injuries" (those requiring professional attention, a concussion that prohibited the player from returning, or any injury that prevented participation the day after the injury) was five times higher in standard rules competitions than Fair Play competitions. They also note that many of the injuries were the result of penalties and checking. More recently, A. M. Smith et al. (2016) compared penalty and injury rates for tournaments using Fair Play rules and tournaments using Intensified Fair Play rules (involving several visual and auditory reminders and announcements regarding Fair Play rules). Overall, there were no differences between these two forms of Fair Play in terms of penalty rates, but differences did emerge with respect to injuries. Specifically, teams

in the basic Fair Play rules tournaments were at a four times greater risk of sustaining a "head hit without a diagnosed concussion" compared to teams in the Intensified Fair Play program. Interestingly, the team with higher levels of poor sportsmanship behavior (i.e., failing to earn more than half of the potential Fair Play points) had an injury rate that was over five times greater than the rate for teams who earned the majority of their Fair Play points.

The existing literature on the Fair Play program in youth ice hockey clearly supports Vaz's (1982) original hypothesis that such a program could effectively reduce unsportsmanlike behavior. Beyond this, findings suggest that Fair Play rules could reduce injury rates and improve registration rates for youth ice hockey. However, this line of research is not without its limitations. For example, in the two studies that investigated effects on injury rates, one lacked a standard rules control group (A. M. Smith et al., 2016) and the other (Roberts et al., 1996) compared injury rates between less intense qualifying rounds (Fair Play) and more intense championship rounds (standard rules), during which athletes may have also been physically fatigued (another confound to injury comparisons). Additionally, A. M. Smith et al. (2016) note that, on average, both the Fair Play and standard rules groups incurred well below the number of penalty minutes allowed, suggesting no behavior change was necessary in order to receive the program's benefits. However, they did not investigate the effect of reducing the penalty limit — a more stringent penalty threshold for earning Fair Play points could impact behavior and result in lower penalty rates.

It is also important that all players, coaches, and parents are aware of the Fair Play rules and whether or not they earned their point after each game. Knowledge of the Fair Play system and how it can affect season standings is an important step in getting teams to understand and commit to the program, but aside from the most recent work by A. M. Smith et al. (2016) researchers did not address this need. Furthermore, throughout the course of research on Fair Play rules, no ties have been made to the theoretical rationale for the intervention or its potential effects. Lastly, many of these studies have suggested the program's effect on sportsmanship, but these effects were inferred from data on observed penalties only and potential moderating variables were not examined. Future investigations of the Fair Play program could strengthen this line of inquiry with the use of self-report questionnaires on sportsmanship behavior, as well as indicators of sportsmanship attitudes and coach sportsmanship behavior.

Present Study

The literature reviewed highlighted the empirical and theoretical support for several components of the present study. First, in the context of youth sport, the principles of ABA can be applied to reduce poor sportsmanship behavior. However, social cognitive theory (Bandura, 1986) would suggest that other environmental and personal factors, such as coach sportsmanship behavior and player sportsmanship attitudes, respectively, could moderate an intervention's effect. Finally, according to Verhagen et al.'s (2010) behavioral injury risk model, an intervention successfully reducing poor sportsmanship behavior would also result in a reduced risk of sport-related

injury. A diagram detailing these theoretical applications to the present study can be seen in Figure 2 — the integrated behavioral model of sport injury interventions.

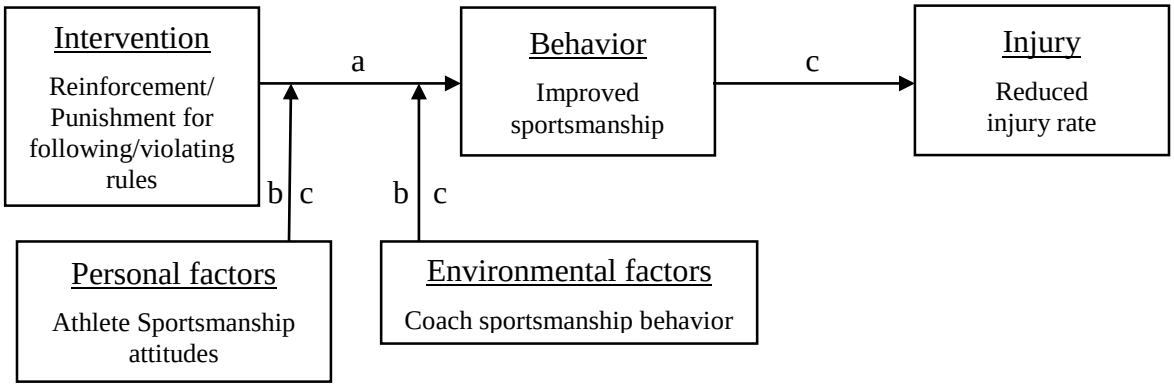

Figure 2. Integrated behavioral model of sport injury interventions. Each portion of the study is driven by theory, specifically ABA (a), Bandura's (1986) social cognitive theory (b), and Verhagen et al. (2010) behavioral injury risk model (c).

Figure 2 also illustrates how the present study addresses several of the gaps in the existing literature. One of the primary gaps in the literature reviewed is the lack of research connecting moral behavior in sport with injury risk. For example, though Wells et al. (2005, 2008) provided support for youth basketball players in the *Play Hard, Play Fair, Play Fun* program having better sportsmanship behavior after the intervention than before and compared to a control group, they did not comment on the practical impact of this change, namely its impact on injuries. In ABA terminology, these studies are failing to address the effectiveness of the intervention because, while they may have detected a statistically significant effect, they have not demonstrated the practical significance of this effect (regardless of effect size).

A second key limitation, particularly with respect to injury prevention, is that interventions appear largely atheoretical (McGlashan & Finch, 2010). Although some interventions contain aspects of relevant injury risk theories (e.g., improving access to safety equipment may increase preventive behavior, Fair Play points may serve as a positive reinforcement), the researchers have not clearly identified the intervention as theory-based nor discussed theoretical implications of their findings. This suggests that many of the injury prevention interventions fall short of meeting the conceptually systematic aspect of ABA.

Third, the lack of a conceptually systematic approach is underscored by research that has investigated the link between sportsmanship behavior and injury, but did not consider environmental influences. The series of studies on Fair Play rules in youth ice hockey, for instance, illustrate how these rules may be driving a reduction in penalty and injury rates (Marcotte & Simard, 1993; Roberts et al., 1996; A. M. Smith et al., 2009, 2014, 2016) with season standing incentives, but they do not account for any potential moderating variables such as coach behavior or the motivational climate (e.g., Stornes & Ommundsen, 2004). For example, the degree to which coaches instruct their athletes to win at all costs, or how much athletes believe it is okay to intentionally harm an opponent to gain a competitive advantage, could alter how the Fair Play intervention impacts the athletes' sportsmanship-related behavior.

Additionally, much of the intervention research has failed to address the behavioral generalizability of its effects. For example, Fair Play rules have demonstrated

their effectiveness in youth ice hockey extensively, but the program has not been expanded to other youth sports. Injury surveillance literature suggests that one promising avenue for extension of Fair Play is youth football, as competition injury rates for youth football are consistently higher than other sports (Beachy & Rauh, 2014; Marar et al., 2012; Radelet et al., 2002; Rechel et al., 2008).

In addition to addressing the limitations described above, the present study also addressed two common methodological weaknesses in injury risk intervention research. First, longitudinal — especially multiple baseline — designs are exceedingly rare in the injury risk intervention literature, as most researchers rely on cross-sectional designs (e.g., Cook et al., 2003; Eime et al., 2005; McGuine & Keene, 2006; Roberts et al., 1996; Whitnall et al., 2005). Second, as highlighted by previous Fair Play research, several injury risk intervention studies are conducted without a control group.

Purposes of Present Study

Based on the research reviewed and the limitations of available intervention research, the purposes of this study were three-fold. The first purpose of the current study was to examine whether youth American football teams using Fair Play rules exhibit better sportsmanship in terms of athletes' behavior and attitudes and athletes' perceptions of coach behavior, compared to teams using standard rules. Secondly, this study aimed to determine if teams using Fair Play rules had lower injury rates than teams using standard rules. The third purpose was to gain a better mechanistic understanding of how the Fair Play intervention influences injury rates (if there was an effect). Changes

over time were also evaluated because the study took place over the course of two football seasons with three experimental conditions: a group using Fair Play rules for two years (FP-FP), a group using standard rules for two years (Std-Std), and a group switching from standard rules in year 1 to Fair Play rules in year 2 (Std-FP).

Three research questions were developed to address purpose one (research questions 1, 2 and 6), one research question was developed to address purpose two (research question 3), and two research questions were developed to address purpose three (research questions 4–5). The specific research questions were:

1. Do youth football teams using Fair Play rules (FP-FP and Std-FP) have a lower rate of observed poor sportsmanship behavior (i.e., Fair Play penalty yards per game) than teams using standard rules for two seasons (Std-Std)?
2. Do youth football players on teams using Fair Play rules (FP-FP and Std-FP) self-report less antisocial behavior toward opponents than players on teams using standard rules for two seasons (Std-Std)?
3. Do youth football teams using Fair Play rules (FP-FP and Std-FP) have lower injury rates than teams using standard rules for two seasons (Std-Std)?
4. Does athlete sportsmanship behavior mediate the relationship between the Fair Play intervention and injury rates?
5. Do athlete self-reported sportsmanship attitudes and/or athletes' perceptions of their coach's sportsmanship behavior moderate the relationship between the Fair Play intervention and athlete sportsmanship behavior?

6. After two seasons, are there differences in athlete self-reported sportsmanship attitudes and athletes' perceptions of their coach's sportsmanship behavior between teams who have used Fair Play rules (FP-FP and Std-FP) and those using standard rules only (Std-Std)?

CHAPTER TWO

Method

Design and Participants

This study employed a multiple baseline design over the course of two youth American football seasons (7th and 8th grade; see Table 2). In the first season, roughly one-third of teams in the study were using Fair Play rules while the remaining teams continued using their standard rules (the state high school athletic association rules). Teams using Fair Play rules in the first season continued to do so in the second season (FP-FP), and an additional subset of the teams transitioned to Fair Play rules for the second season (Std-FP). A final group of the teams used standard rules for both seasons (Std-Std).

Table 2

Intervention Conditions by Season

Group	Season 1	Season 2
FP-FP	Fair Play rules	Fair Play rules
Std-FP	Standard rules	Fair Play rules
Std-Std	Standard rules	Standard rules

Note: FP-FP = Teams using Fair Play rules during both seasons; Std-FP = Teams using standard rules during the 7th grade season and Fair Play rules during the 8th grade season; Std-Std = Teams using standard rules during both seasons.

Participants. All athletes participating in an independent football league from a large Midwestern United States metropolitan area were involved in the observational portion of this study. This league included 40 teams from a variety of rural and urban

areas for the 7th grade season and 39 teams for the 8th grade season; teams were divided into two conferences of two divisions each, for a total of four divisions. During the first season, teams from the smaller, sixteen-team conference were randomly assigned to play under Fair Play rules for both years, one division of the larger, twenty-four team, conference was randomly assigned to be the Std-FP group, and the remaining division was assigned to use standard rules for both seasons. Two teams requested to switch conferences from the 7th to the 8th grade seasons, resulting in a move from using Fair Play rules to standard rules; an additional six teams left the league after the 7th grade season (one from FP-FP and five from STD-FP) and five joined for the 8th grade season (two in Fair Play and three in Standard Rules). At the end of the two-year intervention, there were 13 FP-FP teams, 13 Std-FP teams, and 6 Std-Std teams.

On average, there were twenty-one 13–15-year-old players on each team, with the large majority of participants being male. From this league, participants were recruited to complete questionnaires at the beginning and end of each season. As of the beginning of the 7th grade season, these participants were roughly twelve years old (12.19±0.44), had been involved in football for roughly four years (4.34±1.85), were overwhelmingly Caucasian (85.1%), and roughly half (47.2%) had been injured previously (regardless of cause or activity related to the injury). With the exceptions of being one year older (13.19±0.43) and having one more year of football experience (5.63±1.71), this demographic profile was consistent for the beginning of the 8th grade season with 77.9% being Caucasian and 56.5% previously experiencing an injury. Demographic information

for participants who completed questionnaires, separated by study group can be found in Table 3.

There was a steady decline in the number of participants completing questionnaires at each time point, with 169 participants at the beginning of the 7th grade season, 71 for the end of the 7th grade season, 69 at the beginning of the 8th grade season, and 47 at the end of the 8th grade season. In addition, the same participants were not consistently completing the questionnaires, with 95 completing questionnaires at least once per season and only 9 completing questionnaires at all four time-points.

Fair Play rules. Much like the Fair Play system in youth ice hockey, teams were ranked throughout the season using a combination of their win-loss record and Fair Play points. Teams received two points for each win, one point for each tie, zero points for a loss, and Fair Play points were each worth one additional point; these standings were posted on the league website and updated following each regular season competition. Aspects of the Fair Play rules and study data collection procedures were piloted with 7th grade teams in the season prior to implementing this two-year study. These players were in the 8th grade league when the full study began with 7th grade teams, and were thus not in the study sample. Based on the pilot, the amount of Fair Play penalty yardage allowed in one game before forfeiting the Fair Play point was reduced from 35 yards to 30 yards and minor revisions were made to the penalty and injury tracking forms. The Fair Play penalty yardage threshold was reduced because both groups (standard and Fair Play rules) averaged fewer than 35 Fair Play penalty yards per game.

Table 3

Demographic Information for Participants Completing Questionnaires

	7th					8th				
	n	Age	Ethnicity	Years Football	Past Injury	*n*	Age	Ethnicity	Years Football	Past Injury
FP-FP	73	12.16 (.44)	81.3% Cauc. 12.0% A-A	4.07 (1.91)	39.5%	33	13.24 (.50)	72.7% Cauc. 15.2% A-A	5.53 (1.70)	60.6%
Std-FP	70	12.21 (.45)	86.5% Cauc. 5.4% Multi	4.74 (1.87)	50%	27	13.15 (.36)	81.5% Cauc. 14.8% A-A	6.07 (1.74)	48.1%
Std-Std	26	12.19 (.40)	92.3% Cauc. 7.7% Asian/P-I	4.00 (1.44)	61.5%	9	13.11 (.33)	87.5% Cauc. 12.5% PNA	4.67 (1.32)	66.7%

Note: Information provided reflects pre-season questionnaires for each season with standard deviations provided in parentheses. Age is presented in years. The two most commonly reported ethnicities are provided (Cauc. = Caucasian, A-A = African-American, Multi = Multiracial, Asian/P-I = Asian/Pacific Islander, PNA = Prefer Not to Answer). The percentage under "Past Injury" reflects the percentage of athletes reporting that they have previously been injured.

Despite the lower averages, there were multiple particularly egregious games, in which teams far exceeded the Fair Play penalty yard threshold, during the pilot year. In response to this phenomenon, a punishment was added to the Fair Play system in which teams lost one Fair Play point for each game in which they exceeded the penalty limit by 150% or more (i.e., 45 or more penalty yards). Therefore, Fair Play points served as positive reinforcement for good sportsmanship behavior (demonstrated by committing fewer than the specified number of penalty yards in a game) and also punishment for poor sportsmanship behavior (see Table 4), an extension from previous work using Fair Play rules. This combination of reinforcement and punishment meant that for any given game, a team could earn up to three points toward season standings, but they could also lose one of their existing points.

Table 4

How Game Result and Fair Play Penalty Yards Impact Season Standings

Game Result	Impact on Standings	Relevant Penalty Yards	Impact on Standings
Win	+2	≤ 30	+1
Tie	+1	31–45	0
Lose	+0	> 45	-1

Because only some teams had the opportunity to earn Fair Play points, season standings were determined by the percentage of points earned over the course of the season. For example, the maximum number of points that a team using Fair Play rules could earn was 30 for a ten-game season, whereas regular rules teams could only earn 20 points.

This distinction was important for the conference in which only one of the two divisions used Fair Play rules, but the top two teams in each division were compared to one another to determine playoff standings (a fictitious example to illustrate this is presented in Table 5).

Table 5

Season Standings Example Using Fair Play Rules

Team	Wins	Ties	Losses	Fair Play Points	Total Points	% Points Earned
Mustangs	9	1	0	N/A	19	.950
Jungle Cats	10	0	0	6	26	.867
Stallions	7	1	2	9	24	.800
Gladiators	7	0	3	N/A	14	.700

Note: Teams earn 2 points for a win, 1 point for a tie, 0 points for a loss; Teams can also earn between -1 and +1 Fair Play points each game depending on their relevant penalty yards; % Points Earned = (Total points earned) / (Maximum points possible).

Due to the nature of penalties in football, several adjustments to the ice hockey Fair Play rules were necessary. First, many penalties that are assessed penalty yards in football either do not result in penalty minutes in ice hockey (e.g., offsides) or are unlikely to increase risk of injury (e.g., delay of game); therefore, these penalties did not contribute toward a team's Fair Play penalty yard limit (see Appendix D for a complete list). If, for some reason, an infraction resulted in an unusual yardage penalty (for example, being charged "half the distance to the goal"), the standard penalty yardage was used for Fair Play point calculations (e.g., fifteen yards for pass interference instead of

seven). Any infraction resulting in player, coach, or fan ejection automatically resulted in a team forfeiting its Fair Play point for that game.

Measures

Consistent with social cognitive theory, data were collected on personal attributes, environmental factors, and behavior related to sportsmanship, as well as information on injuries sustained. All post-season questionnaires can be found with items organized by subscale in Appendix B, as can the demographics form, which was only completed at pre-season. Pre-season questionnaires differed in that the instructions refer to "last season" instead of "this season." The observational data tracking forms can be found in Appendix C.

Demographics. Participants provided demographic information during the pre-season data collection period for both the 7th and 8th grade seasons. The information provided in this form included participant age, race/ethnicity, years of football played (and positions, if known), years with their current coach, if they participate in other sports (and if so, which sports), if they have had any previous injuries (and if so, what injuries), and if they are starting the season with any injuries (and if so, provide an explanation).

Personal factors. Participant attitudes about cheating and gamesmanship were measured to assess personal attributes related to sportsmanship. These data were collected at pre-season (8th grade) and post-season (7th and 8th grade) using the Attitudes to Moral Decision-Making in Youth Sport Questionnaire (AMDYSQ; Lee et al., 2007). The AMDYSQ was developed as an addition to existing measures of sportsmanship and

moral attitudes that formally addresses the concept of gamesmanship in young athletes. Gamesmanship is defined as behavior that may be within the rules of the sport, but violate the "spirit of the game" (e.g., trying to upset your opponent). The AMDYSQ is composed of twenty items in which participants respond on a scale ranging from 1 (*Strongly Agree*) to 5 (*Strongly Disagree*), with higher subscale scores representing less negative attitudes (i.e., less acceptance of cheating/gamesmanship). The questionnaire items represent three subscales: Acceptance of Cheating (7 items), Acceptance of Gamesmanship (7 items), and Keeping Winning in Proportion (6 items); however, because of its poor internal reliability ($\alpha = .60$; Lee et al., 2007) and the need to minimize survey length, the "Keeping Winning in Proportion" subscale was not used for this study. Lee et al. (2007) provide support for the 3-factor structure of this questionnaire in independent adolescent samples, as well as the reliability of the Acceptance of Cheating ($\alpha = .73$) and Acceptance of Gamesmanship ($\alpha = .75$) subscales. Lee et al. (2007) also showed concurrent validity for the AMDYSQ using comparisons to the subscales of a related questionnaire, the Multidimensional Sportspersonship Orientations Scale (MSOS; Vallerand, Brière, Blanchard, & Provencher, 1997). Both Acceptance of Cheating ($r = -.30 – -.42$) and Acceptance of Gamesmanship ($r = -.11 – -.42$) were significantly negatively correlated with each of the prosocial MSOS subscales. The low to moderate correlations between factors suggests that, while still addressing attitudes related to morality, the AMDYSQ does not substantially overlap with constructs assessed by the MSOS.

Environmental factors. The present study focused on the coach as an environmental factor that influences player sportsmanship. A portion of the Sportsmanship Coaching Behaviors Scale (SCBS; Bolter & Weiss, 2012) was utilized to measure this environmental impact (7th grade season post-season and both pre- and post-season for the 8th grade season). Bolter and Weiss (2012, 2013) developed and validated the SCBS to a 30-item athlete-report measure of six dimensions of their coach's sportsmanship behavior. The six SCBS subscales — Sets Expectations for Good Sportsmanship, Reinforces Good Sportsmanship, Punishes Poor Sportsmanship, Teaches Good Sportsmanship, Models Good Sportsmanship, and Prioritizes Winning Over Good Sportsmanship — each contain five items, to which participants respond from 1 (*Never*) to 5 (*Very often*). Bolter and Weiss (2012, 2013) also provide reliability (α = .85-.92) of the SCBS subscales and factor structure with an adolescent sample. Evidence of the subscale validities, with the exception of Punishes Poor Sportsmanship, was provided with low to moderate correlation in the expected direction with subscales of the Prosocial and Antisocial Behavior in Sport Scale (discussed below). However, because of its relevance for the current study (i.e., the direct link to operant conditioning), the Punishes Poor Sportsmanship subscale was used, in addition to the Models Good Sportsmanship and Prioritizes Winning Over Good Sportsmanship subscales. For these subscales, higher scores represented more of the behavior in question — a high score on Models Good Sportsmanship would be positive, meaning the coach was perceived as often modeling good sportsmanship, whereas high scores on Prioritizes Winning Over Good

Sportsmanship would be negative, suggesting the coach is perceived as often valuing winning more than good sportsmanship.

Behavior. Behavioral outcomes were assessed through self-reported antisocial sport behavior as well as researcher observation of in-game penalties. Participants completed a portion of the Prosocial and Antisocial Behavior in Sport Scale (PABSS; Kavussanu & Boardley, 2009) at pre-season and post-season data collection periods during both seasons. The PABSS is a 20-item, four-factor (individual prosocial and antisocial behavior, directed at either teammates or opponents), Likert-type questionnaire with response options anchored by 1 (*Never*) and 5 (*Very Often*). Because the current study's emphasis on reducing poor sportsmanship-related behavior toward opponents, only the Antisocial Behavior Toward Opponents subscale was used, for which higher scores represented more antisocial behavior toward opponents. Kavussanu and Boardley (2009) documented this subscale's reliability ($\alpha = .84$) in a diverse sample of adolescent and young adult team sport athletes. The concurrent validity of the PABSS was shown by moderate positive correlations between antisocial behavior toward opponents and ego-goal orientation ($r = .32$) and a moderate negative correlation was reported between antisocial behavior toward opponents and empathy ($r = -.55$).

A second indicator of behavioral outcomes was provided by observational data. Specifically, trained research assistants attended games and documented each penalty a team incurred during a game. All games for the league were officiated by three certified high school officials, providing a high degree of confidence in our penalty data.

Following each day of games, penalties were separated into those that contributed to a team's Fair Play penalty limit and those that did not. The average number of Fair Play penalty yards for each team was calculated by dividing their total number of Fair Play penalty yards by the number of observations for the team throughout the season.

Injury. Injury data were also collected using observational methods. This method permitted the application of a consistent definition of injury across all participants, which could not have been assured with self-report of injuries. Additionally, self-report of injuries after each game was not practically feasible, and post-season reporting would be at considerable risk of recall bias.

Consistent with previous research (e.g., Radelet et al., 2002), an injury was defined as any time a player was attended to by an adult during the course of the game. This included instances in which the game was stopped for a parent or coach to check on the health of a player as well as when a player removed himself or herself from the game to receive medical attention (see Appendix C for this tracking document).

The injury rate was expressed as injuries per 1000 athlete exposures ([number of injuries/athlete exposures] x 1000), rather than relying on total number of injuries. An athletic exposure was defined as one athlete taking part in one game. In addition to expressing the injury risk for a given team, injury data were used to compute the injury rate for a team's opponents throughout each season (e.g., the rate at which a team's opponents sustained an injury).

Injury severity was indicated based on competition time lost following the injury. In order to evaluate injury severity, players not able to return to a competition following an injury were recorded and their participation in the following competition was documented. If an injured player returned to the game in which he or she was injured, the injury was counted as a "nuisance" injury. Injuries were considered "minor" if the player did not return to the game in which he or she was injured, "moderate" if the athlete did not compete for the following two weeks as well, and "major" if three or more weeks of competition were missed. This categorization is consistent with the work of Roberts et al. (1996) in the youth ice hockey Fair Play literature; however, there was no way to verify that athletes were held out from competition in subsequent weeks strictly as a result of the injury (e.g., a player may have been on a family vacation the week after they were injured and sat out the second half of a game).

Procedure

Prior to the beginning of each football season, all league coaches were required to attend an informational session during which the league commissioner reviewed policies and procedures outlined in the league handbook. A portion of this meeting (led by the lead researcher), as well as a portion of the league handbook (written by the lead researcher), was dedicated to educating coaches about the Fair Play rules and the research study. Coaches were asked to relay this information to team members and parents.

All coaches were contacted to schedule a time for the lead researcher or a trained research assistant to attend a practice, directly provide information about the study to all

players and parents present, and distribute consent and assent forms in accordance with the approved Institutional Review Board (IRB) protocol (see Appendix E–G for the IRB approval, parental informed consent, and child assent forms). A second meeting was held within two weeks to collect signed consent/assent forms (for season one) and have participants complete preseason questionnaires. Signed consent and assent forms were not collected in the second season because passive consent was used for all participants, whereby participants were automatically enrolled in the study unless they "opted-out" by signing and returning consent and assent forms (see Appendix F for IRB approval letter). All coaches were contacted again in the final two weeks of the regular season, either over the telephone or in-person following a game, to schedule the completion of post-season questionnaires by their athletes. When possible, post-season questionnaires were completed at a post-season banquet or designated equipment return time; however, for some teams, the only chance for data collection was following the conclusion of their final regular season game (see Table 6 for timeline of measures). All forms and questionnaires were completed as paper-and-pencil measures.

Research assistant training. In order to collect observational data in a league of this size, seven research assistants were trained for the project in season one and eight for season two. In the academic semester prior to their involvement, the lead researcher met individually with each research assistant multiple times. These meetings provided an opportunity for the research assistants to develop a better understanding of the background and rationale of the study, as well as the study's consent process, data

Table 6

Timeline of Study Measures

	7th Grade		8th Grade	
	Pre-Season	Post-Season	Pre-Season	Post-Season
Demographics	X		X	
AMDYSQ		X	X	X
SCBS		X	X	X
PABSS	X	X	X	X

Note: PABSS = Prosocial and Antisocial Behavior in Sport Scale (Kavussanu & Boardley, 2009); AMDYSQ = Attitudes to Moral Decision Making in Youth Sport Questionnaire (Lee et al., 2007); SCBS = Sportsmanship Coaching Behaviors Scale (Bolter & Weiss, 2012).

collection and entry procedures, how to operate the laboratory camera and tripod, and how to handle situations that were experienced during the pilot testing (e.g., parents and officials asking why they are taking notes on the game, arriving at the designated location and not finding any teams there) as well as potential situations that had not yet been experienced (e.g., being approached by an angry coach). Following these meetings, all research assistants were provided with literature to become familiar with over the summer (e.g., previous Fair Play research, the current study protocols, consent/assent forms, penalty and injury tracking forms, and all study questionnaires).

Prior to the beginning of the season, weekly group meetings were scheduled with the lead researcher and all research assistants. At the first of these meetings, each research assistant was responsible for teaching everyone else one element of the consent and/or data collection process; this was repeated, with group feedback, until all aspects had been covered accurately. Between the lead researcher and research assistants, over

90% of all games (Fair Play and standard rules) were attended throughout each season in order to track team penalties, injuries, and count the total number of participants in each competition. Furthermore, during the 8th grade season, one research assistant per week was responsible for video recording at least one game for which he/she was conducting observations. These recordings were used to establish inter-rater reliability of penalty and injury observation data.

CHAPTER THREE

Results

All statistical analyses were conducted using SPSS 23.0 (IBM Corp, Armonk, New York). Internal consistency reliabilities for questionnaire data at each time point were determined using Cronbach's alpha coefficients. Additionally, descriptive statistics were calculated for all demographic, questionnaire, and observational data. Furthermore, bivariate Pearson correlation coefficients were calculated to evaluate inter-rater reliability of observational data. These analyses, as well as those conducted to address the current study's research questions, are described in more detail below.

Scale Reliabilities

Most of the questionnaires completed achieved at least acceptable internal reliability ($\alpha = .70$) across each time point using Cronbach's alpha coefficients. The exceptions to this finding were the AMDYSQ Gamesmanship subscale ($\alpha = .64$–$.70$), which ranged from questionable to acceptable, and the pre-7th grade time point for the PABSS antisocial behavior toward opponents subscale ($\alpha = .63$), which was of questionable internal reliability. Tables 7, 8, and 9 provide the alpha reliabilities and bivariate correlations among subscales completed at the post-7th grade season, pre-8th grade season, and post-8th grade season timepoints. The bivariate correlations indicate some relation among the constructs assessed, but not enough to suggest multicollinearity that would preclude a MANOVA. Negative correlations are the result of subscale scoring; for the Antisocial Behavior Toward Opponents subscale of the PABSS and

Prioritizes Winning Over Good Sportsmanship subscale of the SCBS higher scores represent poor outcomes (i.e., more unsportsmanlike behavior and putting winning before good sportsmanship), whereas high scores represented positive outcomes (i.e., not being accepting of cheating or gamesmanship, punishing poor sportsmanship, and modeling good sportsmanship) for each of the other subscales.

Two independent researchers recorded penalties and injuries (one live and one via video recording) for twelve games during the 8th grade season. There was exceptional reliability between the two observers for observations of Fair Play penalty yards (r = .94) and injuries sustained (r = .96).

Table 7

Bivariate Correlations and Alpha Reliabilities for Post-7th Grade Timepoint

Subscale	1	2	3	4	5	6
1. PABSS — AO	.83					
2. AMDYSQ — Cheating	-.27	.87				
3. AMDYSQ — Gamesmanship	-.39*	.66*	.70			
4. SCBS — Punishes	.06	.23	.11	.77		
5. SCBS — Models Good	-.04	-.04	.07	.18	.92	
6. SCBS — Prioritizes	.31*	-.22	-.24	-.09	-.26	.75

Note: PABSS — AO = Prosocial and Antisocial Behavior in Sport Scale — Antisocial Behavior Toward Opponents Subscale (Kavussanu & Boardley, 2009); AMDYSQ = Attitudes to Moral Decision Making in Youth Sport Questionnaire — Cheating and Gamesmanship subscales (Lee et al., 2007); SCBS = Sportsmanship Coaching Behaviors Scale — Punishes Poor Sportsmanship, Models Good Sportsmanship, and Prioritizes Winning Over Good Sportsmanship subscales (Bolter & Weiss, 2012). Alpha coefficients are presented on the diagonal. *p < .003 following Bonferroni correction (.05/15 = .003).

Table 8

Bivariate Correlations and Alpha Reliabilities for Pre-8th Grade Timepoint

Subscale	1	2	3	4	5	6
1. PABSS — AO	.83					
2. AMDYSQ — Cheating	-.50*	.83				
3. AMDYSQ — Gamesmanship	-.57*	.58*	.64			
4. SCBS — Punishes	.08	.03	-.11	.81		
5. SCBS — Models Good	-.17	.38*	.20*	.23*	.87	
6. SCBS — Prioritizes	.40*	-.36	-.28*	-.11	.37*	.80

Note: PABSS — AO = Prosocial and Antisocial Behavior in Sport Scale — Antisocial Behavior Toward Opponents Subscale (Kavussanu & Boardley, 2009); AMDYSQ = Attitudes to Moral Decision Making in Youth Sport Questionnaire — Cheating and Gamesmanship subscales (Lee et al., 2007); SCBS = Sportsmanship Coaching Behaviors Scale — Punishes Poor Sportsmanship, Models Good Sportsmanship, and Prioritizes Winning Over Good Sportsmanship subscales (Bolter & Weiss, 2012). Alpha coefficients are presented on the diagonal. *$p < .003$ following Bonferroni correction (.05/15 = .003).

Table 9

Bivariate Correlations and Alpha Reliabilities for Post-8th Grade Timepoint

Subscale	1	2	3	4	5	6
1. PABSS — AO	.81					
2. AMDYSQ — Cheating	-.60*	.82				
3. AMDYSQ — Gamesmanship	-.66*	.59*	.69			
4. SCBS — Punishes	.04	.07	-.05	.84		
5. SCBS — Models Good	-.19	.33*	.30*	.37*	.84	
6. SCBS — Prioritizes	.21	-.24	-.20	-.23	-.41*	.82

Note: PABSS — AO = Prosocial and Antisocial Behavior in Sport Scale — Antisocial Behavior Toward Opponents Subscale (Kavussanu & Boardley, 2009); AMDYSQ = Attitudes to Moral Decision Making in Youth Sport Questionnaire — Cheating and Gamesmanship subscales (Lee et al., 2007); SCBS = Sportsmanship Coaching Behaviors Scale — Punishes Poor Sportsmanship, Models Good Sportsmanship, and Prioritizes Winning Over Good Sportsmanship subscales (Bolter & Weiss, 2012). Alpha coefficients are presented on the diagonal. *$p < .003$ following Bonferroni correction (.05/15 = .003).

Descriptive Statistics

The in-game observational data allowed for the calculation of injury rates for each team, expressed as the number of injuries per 1000 AEs. The observational data also enabled the calculation of injury rates for a team's opponents throughout the season (i.e., a rate of "opponent injuries"), using opponent injuries sustained as the numerator and 1000 opponent AEs as the denominator. The overall number of injuries (i.e., the sum of injuries from all severity categories), number of injuries resulting in a player not being able to return to the game (i.e., more than nuisance injuries), number of AEs, overall injury rates, and more than nuisance injury rates are presented in Tables 10 and 11. These tables are separated by season and group, with Table 10 presenting data for injuries sustained and Table 11 presenting data for opponents' injuries.

Lastly, observation of team penalties at games allowed for the calculation of Fair Play penalty rates, expressed as the average number of Fair Play penalty yards incurred per game. Table 13 provides the mean values for Fair Play penalty yards per game, separated by group and season.

A summary of descriptive statistics for each of the completed questionnaires at each time point is presented in Table 12, separated by study group. Only the PABSS — AO subscale was completed prior to the beginning of the 7th grade season. This was, in part, because the participants may not have had experiences with this league and their

Table 10

Injuries Sustained and Injury Rates by Group and Season

	7th Grade						8th Grade					
	FP-FP	Std-FP	Std-Std	Current FP	Current Std.	Total	FP-FP	Std-FP	Std-Std	Current FP	Current Std.	Total
Overall Injuries	138	92	36	167	191	358	108	72	28	194	62	256
More than Nuisance Injuries	40	19	8	51	36	87	22	15	9	41	18	59
Athlete Exposures	2553	2132	838	3219	3967	7186	2016	1596	750	4058	1611	5669
Overall Injury Rate	52.88	45.15	43.79	51.24	48.88	49.82	55.87	44.15	42.90	49.38	41.78	45.16
More than Nuisance Injury Rate	14.90	8.63	9.86	15.27	8.95	12.11	11.01	9.46	11.30	10.34	11.22	10.41
n	13	13	6	16	24	40	13	13	6	24	10	34

Note: Overall Injuries and More than Nuisance Injuries represent frequency count; AE = Athlete Exposures; Injury rates expressed as injuries per 1000 AE by dividing the frequency count of Overall/More than Nuisance Injuries by the Total AE and multiplying the result by 1000; FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons; Current FP = All teams currently using Fair Play rules, regardless of group assignment; Current Std = All teams currently using standard rules, regardless of group assignment; *n* represents the number of teams observed for each group.

Table 11

Opponent Injuries and Opponent Injury Rates by Group and Season

	7th Grade						8th Grade					
	FP-FP	Std-FP	Std-Std	Current FP	Current Std.	Total	FP-FP	Std-FP	Std-Std	Current FP	Current Std.	Total
Overall Injuries	120	97	40	158	171	329	91	58	37	167	71	238
More than Nuisance Injuries	41	21	9	52	37	89	23	19	14	50	24	74
Athlete Exposures	2366	1791	795	2975	3451	6426	1892	1509	771	3770	1519	5289
Overall Injury Rate	50.13	52.04	57.07	52.51	50.91	51.20	50.36	43.67	46.86	47.89	45.41	45.00
More than Nuisance Injury Rate	17.59	10.85	14.89	17.68	11.46	13.85	12.08	13.63	17.20	13.44	14.87	13.99
n	13	13	6	16	24	40	13	13	6	24	10	34

Note: Overall Injuries and More than Nuisance Injuries represent frequency count; AE = Athlete Exposures; Injury rates expressed as injuries per 1000 AE by dividing the frequency count of Overall/More than Nuisance Injuries by the Total AE and multiplying the result by 1000; FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons; Current FP = All teams currently using Fair Play rules, regardless of group assignment; Current Std = All teams currently using standard rules, regardless of group assignment; *n* represents the number of teams observed for each group.

Table 12

Descriptive Statistics of Athlete-Reported Questionnaire Data on Sportsmanship

		FP-FP		Std-FP		Std-Std	
Subscale	Time	*n*	Mean (SD)	*n*	Mean (SD)	*n*	Mean (SD)
AMDYSQ – Cheating	Post-7th	58	4.15 (0.99)	17	4.27 (0.61)	6	4.53 (0.52)
	Pre-8th	32	3.98 (0.77)	26	4.20 (0.65)	8	3.88 (0.94)
	Post-8th	23	4.02 (0.90)	7	4.19 (0.57)	6	3.81 (0.89)
AMDYSQ – Gamesmanship	Post-7th	62	3.54 (0.75)	19	3.49 (0.87)	6	4.06 (0.58)
	Pre-8th	32	3.41 (0.74)	27	3.52 (0.57)	8	3.56 (0.87)
	Post-8th	21	3.33 (0.71)	8	3.65 (0.88)	5	3.47 (0.95)
PABSS – AO	Pre-7th	66	1.49 (0.44)	72	1.47 (0.51)	20	1.46 (0.39)
	Post-7th	64	1.54 (0.64)	17	1.54 (0.55)	5	1.60 (0.19)
	Pre-8th	28	1.75 (0.61)	25	1.47 (0.44)	9	1.76 (0.63)
	Post-8th	25	1.81 (0.67)	12	1.70 (0.56)	5	1.70 (0.54)
SCBS – Punishes Poor Sportsmanship	Post-7th	61	2.88 (0.91)	18	2.69 (0.68)	6	3.13 (1.23)
	Pre-8th	29	3.02 (1.09)	22	3.43 (1.00)	8	3.25 (1.20)
	Post-8th	27	3.26 (1.16)	11	3.34 (1.13)	6	2.88 (0.97)
SCBS – Models Good Sportsmanship	Post-7th	62	4.11 (0.95)	18	4.19 (0.60)	6	4.46 (0.43)
	Pre-8th	29	4.17 (0.89)	23	4.31 (0.58)	8	4.03 (0.89)
	Post-8th	26	4.46 (0.78)	10	4.70 (0.37)	6	3.50 (0.65)
SCBS – Prioritizes Winning Over Sportsmanship	Post-7th	62	2.27 (0.88)	18	2.13 (0.73)	6	1.88 (0.93)
	Pre-8th	29	2.09 (0.81)	23	1.79 (0.65)	9	2.08 (0.63)
	Post-8th	25	2.08 (0.94)	11	1.77 (0.75)	6	2.08 (0.26)

Note: PABSS-AO = Prosocial and Antisocial Behavior in Sport Scale - Antisocial Behavior Toward Opponents Subscale (Kavussanu & Boardley, 2009); AMDYSQ = Attitudes to Moral Decision Making in Youth Sport Questionnaire (Lee et al., 2007); SCBS = Sportsmanship Coaching Behaviors Scale (Bolter & Weiss, 2012). FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons.

current coach that would have allowed them to report on his sportsmanship behavior, and information they do have would require a recall of roughly one year with possible interference from experiences in other sports and with other coaches. The descriptive statistics show a potential floor effect across all groups in regards to participants' self-reporting of their antisocial behavior toward opponents.

Observational Data Analyses

Linear mixed-effects models were calculated in order to address research questions 1, 3, and 4. These models are often used in longitudinal research and provide a flexible approach to assess within-subject changes over time and between-subject differences, while accounting for both fixed (e.g., the intervention) and random (e.g., specific teams) effects. To address research question 1, the model was constructed with Fair Play penalty yards per game as the dependent variable, year (7^{th} or 8^{th} grade season), condition (Fair Play or standard rules), and the year by condition interaction as fixed effects, and team as a random effect. In light of the several ways to evaluate injuries, six models were constructed to evaluate research question 3 — one each for the rate of overall, more than nuisance, and head/neck injuries per 1000 AEs sustained by team and one each for the rate of overall, more than nuisance, and head/neck injuries per 1000 AEs sustained by a team's opponents. For each of these models, injury rate was the dependent variable, team was entered as a random effect, and year, condition, and the year by condition interaction were all entered as fixed effects. In addition to components from the previously constructed models, one additional model (for each type of injury rate) had

to be constructed in order to address research question 4; for these models, injury rate was the dependent variable, team was the random effect, and year, condition, Fair Play penalty yards per game, and the year by condition interaction were entered as the fixed effects. These steps enable an interpretation in line with Baron and Kenny's (1986) conceptualization of the mediation model. Although the Baron and Kenny (1986) mediation model has been criticized for low power and alternative tests have been developed (Hayes, 2009; Preacher, 2015; Zhao, Lynch, & Chen, 2010), the complex design of the current study precluded the use of these more direct tests of mediation effects.

Research question 1. The first research question of the current study focused on whether youth football teams using Fair Play rules had a lower rate of observed poor sportsmanship behavior, which was evaluated based on Fair Play penalty yards per game, than teams using standard rules (see Figure 3).

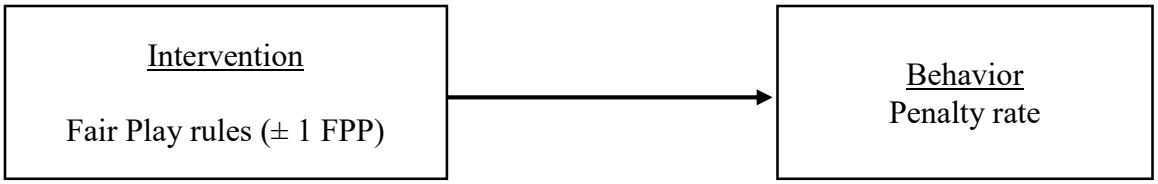

Figure 3. Research question 1 within the integrated behavioral model of sport injury interventions.

The linear mixed model to address research question 1 revealed no significant changes in Fair Play penalty yards per game (i.e., observed sportsmanship behavior) by group, $F(2,26.21) = 0.28$, $p > .05$, but there was a statistically significant increase in Fair Play

penalty yards per game from the 7th to 8th grade season, $F(1,26.66) = 26.33$, $p < .05$; the group by year interaction was not significant, $F(2,26.64) = 1.13$, $p > .05$. The estimated marginal means for Fair Play penalty yards per game for each group, separated by year, can be found in Table 13. Though the differences were not statistically significant, the mean values show that the FP-FP group had a slightly lower average number of Fair Play penalty yards per game than the other groups during the 7th grade season (with the Std-Std group being the highest), but the opposite was true during the 8th grade season, with the FP-FP group having a slightly higher average than the other two groups (with the Std-Std group having the fewest Fair Play penalty yards per game). These mean values also clearly show an increase in Fair Play penalty yards per game from the 7th grade season

Table 13

Estimated Marginal Means of Fair Play Penalty Yards Per Game by Group and Season

	7th Grade		8th Grade	
	Fair Play Penalty Yards Per Game (±SD)	*n*	Fair Play Penalty Yards Per Game (±SD)	*n*
Total	16.26 (1.07)	40	22.88 (1.23)	34
FP-FP	15.12 (1.81)	13	26.13 (1.88)	13
Std-FP	16.15 (1.81)	13	24.61 (2.05)	13
Std-Std	16.26 (2.67)	6	21.18 (2.91)	6
Current FP	15.75 (1.62)	16	25.42 (1.33)	24
Current Std.	16.77 (1.34)	24	20.34 (2.04)	10

Note: FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons. Current FP = All teams currently using Fair Play rules, regardless of their group assignment. Current Std = All teams currently using standard rules, regardless of their group assignment; *n* represents the number of teams observed for each group.

to the 8th grade season for all groups.

Research question 3. The third research question for the current study focused on if teams using Fair Play rules had lower injury rates (per 1000 AEs) than teams using standard rules (see Figure 4). The linear mixed models fitted to evaluate the direct effect of Fair Play rules on the three injury rate categories (overall, more than nuisance, and head/neck) are discussed below, first for the rates of injuries sustained followed by the rates of opponents' injuries.

Figure 4. Research question 3 within the integrated behavioral model of sport injury interventions.

Injuries sustained. The first set of models showed no significant changes in the rate of overall, $F(2,29.72) = 0.85$, $p > .05$, partial $\eta^2 = .07$, or more than nuisance injuries, $F(2,30.03) = 1.03$, $p > .05$, partial $\eta^2 = .05$, based on group, but there was a significant effect of group for the rate of head/neck injuries, $F(2,30.16) = 5.39$, $p < .05$, partial $\eta^2 = .27$. Specifically, the FP-FP group had a significantly higher rate of head/neck injuries than the Std-Std group, but no other comparisons were significant (see Figure 5). There were also no significant effects of time for the rate of overall, $F(1,28.46) = 0.10$, $p > .05$, partial $\eta^2 = .00$, more than nuisance, $F(1,29.02) = 0.07$, $p > .05$, partial $\eta^2 = .01$, or

head/neck injuries, $F(1,29.12) = 2.46$, $p < .05$, partial $\eta^2 = .07$. No group by year interactions were significant (overall injury rate partial $\eta^2 = .00$; more than nuisance injury rate partial $\eta^2 = .03$; head/neck injury rate partial $\eta^2 = .10$).

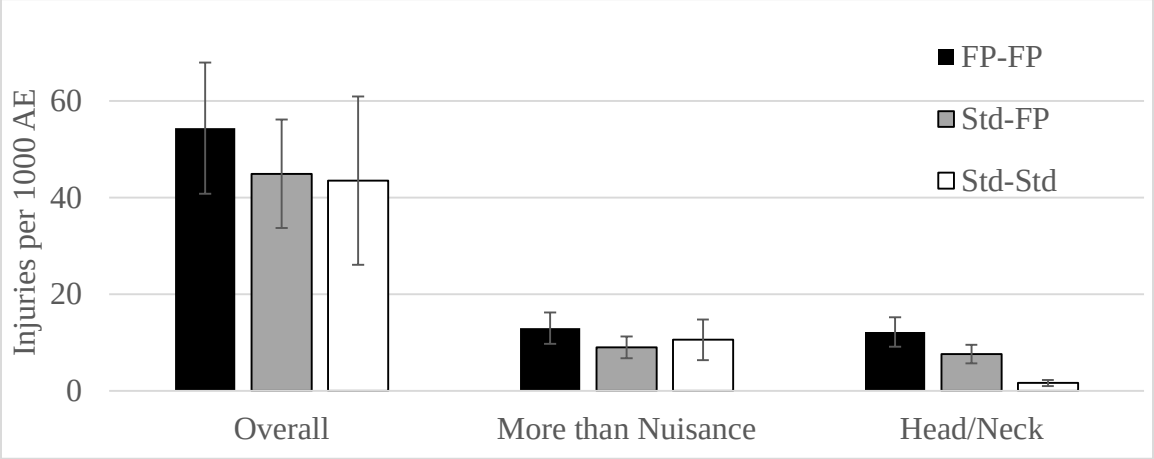

Figure 5. Rates of sustained injuries separated by injury type. There was a significantly higher rate of head/neck injuries in the FP-FP teams than the Std-Std teams; no other comparisons were statistically significant.

The estimated marginal means for the rates of injuries sustained in each group can be found collapsed across year to show overall group differences in Table 14, and separated by year to show changes over time for each group in Table 15. Though none of these differences were statistically significant, examining the means can still provide insight on trends in the data. The mean values show that across all types of injuries the rate was higher for the FP-FP group. When separated by year, the means suggest that the overall injury rate was consistently higher for the FP-FP group, which slightly increased from the 7th grade to 8th grade season, while the other groups remained steady. The more

than nuisance injury rate was also highest for the FP-FP group during the 7th grade season, but this number decreased during the 8th grade season, while the rate increased for the remaining groups, resulting in the Std-Std group having the highest rate of more than nuisance injuries during the 8th grade season. Once again, the FP-FP group had the highest rate for head/neck injuries, and all groups experienced an increase in the rate of head/neck injuries from the 7th to 8th grade season.

Table 14

Estimated Marginal Means of Injuries Sustained by Group, Collapsed Across Years

	Overall Injury Rate (95% CI)	More than Nuisance Injury Rate (95% CI)	Head/Neck Injury Rate (95% CI)
FP-FP	54.38 (42.46–66.29)	12.98 (9.01–16.94)	12.19 (8.56–15.81)
Std-FP	44.93 (32.58–57.28)	8.98 (4.86–13.09)	7.63 (3.86–11.39)
Std-Std	43.52 (25.63–61.40)	10.56 (4.60–16.51)	1.62 (–3.83–7.07)
Current FP	50.27 (41.74–58.80)	12.81 (9.93–15.69)	9.67 (6.67–12.67)
Current Std	45.84 (36.24–55.44)	10.04 (6.74–13.34)	8.29 (4.92–11.67)

Note: All injury rates are expressed as injuries per 1000 Athlete Exposures; 95% CI = 95% Confidence Interval for the mean presented; FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons. Current FP = All teams currently using Fair Play rules, regardless of their group assignment. Current Std = All teams currently using standard rules, regardless of their group assignment; n = 13 for FP-FP, 13 for Std-FP, 6 for Std-Std, 16 for Current FP 7th Grade, 24 for current Std 7th Grade, 24 for current FP 8th Grade, and 10 for current Std 8th Grade.

Opponent injuries. Similar models were fitted to evaluate the effect of Fair Play rules on the rate at which teams' opponents sustained injuries. These models showed no significant effect of group on the rate of overall, $F(2,28.57) = 0.09$, $p > .05$, partial $\eta^2 = .01$, more than nuisance, $F(2,53) = 0.42$, $p > .05$, partial $\eta^2 = .04$, or head/neck injuries,

Table 15

Estimated Marginal Means of Injuries Sustained by Group, Year, and Injury Type

	Season	FP-FP	Std-FP	Std-Std	Current FP	Current Std	Total
Overall	7th	52.88	45.15	43.79	50.75	49.19	49.97
Injury Rate	Grade	(38.14–67.62)	(30.41–59.89)	(22.10–65.49)	(38.41–63.09)	(39.08–59.30)	(41.93–58.01)
(95% CI)	8th	55.87	44.71	43.24	49.80	42.49	46.14
	Grade	(40.56–71.18)	(28.00–61.41)	(19.58–66.90)	(39.69–59.90)	(26.92–58.07)	(36.81–55.47)
More than	7th	14.90	8.63	9.86	15.28	8.99	12.13
Nuisance	Grade	(9.92–19.89)	(3.65–13.61)	(2.53–17.20)	(10.95–19.60)	(5.45–12.52)	(9.34–14.93)
Injury Rate	8th	11.05	9.33	11.26	10.35	11.10	10.72
(95% CI)	Grade	(5.87–16.23)	(3.67–14.99)	(3.24–19.27)	(6.81–13.88)	(5.63–16.57)	(7.46–13.98)
Head/Neck	7th	8.32	7.03	1.17	7.58	6.14	6.86
Injury Rate	Grade	(3.77–12.87)	(2.48–11.59)	(-5.53–9.38)	(3.23–11.93)	(2.58–9.70)	(4.03–9.69)
(95% CI)	8th	16.05	8.22	2.07	11.76	10.45	11.10
	Grade	(11.32–20.79)	(3.05–13.39)	(-5.25–9.38)	(8.20–15.32)	(4.96–15.94)	(7.82–14.39)

Note: All injury rates are expressed as injuries per 1000 Athlete Exposures; 95% CI = 95% Confidence Interval for the mean presented; FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons. Current FP = All teams currently using Fair Play rules, regardless of their group assignment. Current Std = All teams currently using standard rules, regardless of their group assignment; *n* = 13 for FP-FP, 13 for Std-FP, 6 for Std-Std, 16 for Current FP 7th Grade, 24 for current Std 7th Grade, 24 for current FP 8th Grade, and 10 for current Std 8th Grade.

$F(2,28.79) = 0.99$, $p > .05$, partial $\eta^2 = .08$. There were also no significant effects of year on the rate of overall, $F(1,27.50) = 1.12$, $p > .05$, partial $\eta^2 = .08$, or more than nuisance injuries, $F(1,53) = 0.00$, $p > .05$, partial $\eta^2 = .00$, but there was a significant increase in the rate of head/neck injuries from 7th to 8th grade, $F(1,28.23) = 4.98$, $p < .05$ partial $\eta^2 = .11$ (see Figure 6). There were also no significant group by year interactions (overall injury rate partial $\eta^2 = .04$; more than nuisance injury rate partial $\eta^2 = .05$; head/neck injury rate partial $\eta^2 = .17$).

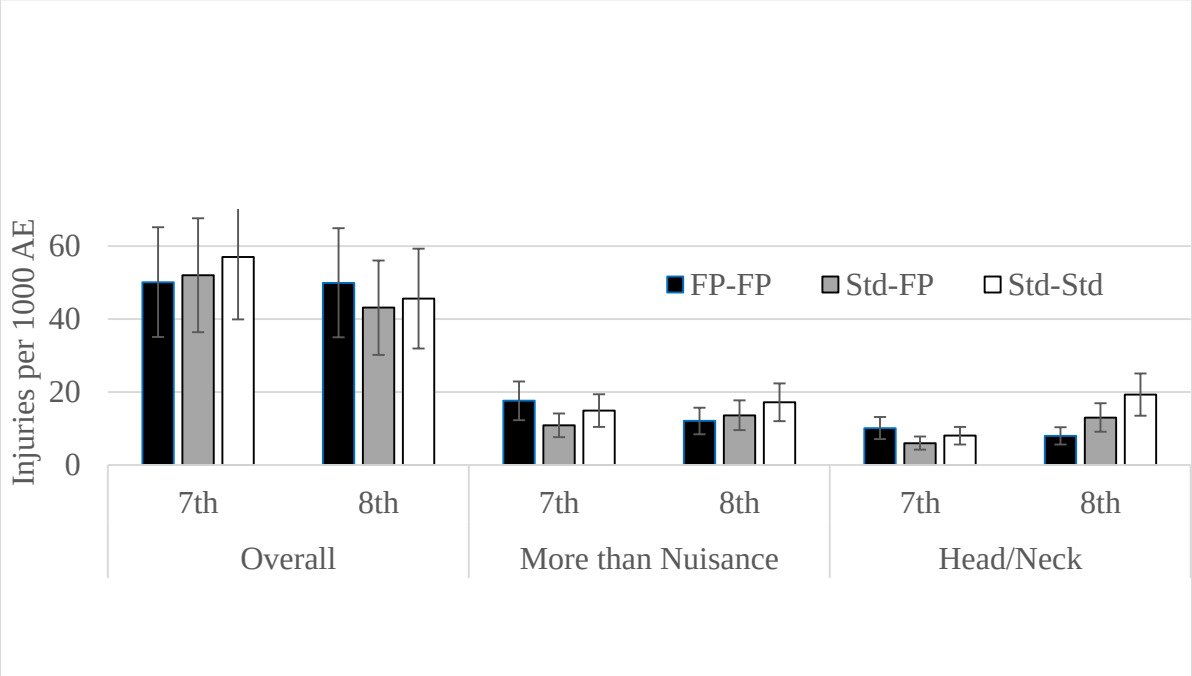

Figure 6. Rates of opponent injuries separated by injury type. There was a significant increase in the rate of head/neck injuries from the 7th to the 8th grade season; no other comparisons were statistically significant.

The rates of opponent injuries in each group can be found collapsed across year to show overall group differences in Table 16, and separated by year to show changes over time for each group in Table 17. As with the rates for injuries sustained, though none of the group differences were statistically significant, the means were examined for descriptive trends. The mean values show that across each injury category, the Std-Std group opponents had a slightly higher rate than the other two groups.

Table 16

Estimated Marginal Means of Opponent Injuries by Group, Collapsed Across Years

	Overall Injury Rate (95% CI)	More than Nuisance Injury Rate (95% CI)	Head/Neck Injury Rate (95% CI)
FP-FP	50.05 (38.90–61.21)	14.83 (9.89–19.77)	9.02 (5.13–12.91)
Std-FP	47.61 (36.04–59.17)	12.24 (7.05–17.43)	9.48 (5.43–13.54)
Std-Std	51.36 (34.61–68.11)	16.04 (8.58–23.51)	13.66 (7.81–19.52)
Current FP	49.43 (41.22–57.64)	15.56 (11.72–19.39)	10.38 (7.37–13.39)
Current Std	48.04 (38.73–57.36)	13.16 (8.69–17.63)	11.46 (8.00–14.91)

Note: All injury rates are expressed as injuries per 1000 Athlete Exposures; 95% CI = 95% Confidence Interval for the mean presented; FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons. Current FP = All teams currently using Fair Play rules, regardless of their group assignment. Current Std = All teams currently using standard rules, regardless of their group assignment; n = 13 for FP-FP, 13 for Std-FP, 6 for Std-Std, 16 for Current FP 7th Grade, 24 for current Std 7th Grade, 24 for current FP 8th Grade, and 10 for current Std 8th Grade.

When separated by year, the means suggest the FP-FP group opponents had the lowest rate for overall injuries during the 7th grade season, but this rate remained unchanged in

Table 17

Estimated Marginal Means of Opponent Injuries by Group, Year, and Injury Type

	Season	FP-FP	Std-FP	Std-Std	Current FP	Current Std	Total
Overall	7th	50.13	52.04	57.07	51.72	51.16	51.44
Injury Rate	Grade	(36.23–64.03)	(38.14–65.94)	(36.62–77.53)	(39.62–63.81)	(41.27–61.05)	(43.60–59.28)
(95% CI)	8th	49.97	43.17	45.65	47.15	44.93	46.04
	Grade	(35.53–64.42)	(27.40–58.93)	(23.32–67.97)	(37.26–57.04)	(29.64–60.21)	(36.91–55.16)
More than	7th	17.59	10.85	14.89	17.68	11.46	14.57
Nuisance	Grade	(10.75–24.43)	(4.01–17.69)	(4.82–24.96)	(11.74–23.62)	(6.61–16.31)	(10.73–18.40)
Injury Rate	8th	12.08	13.63	17.20	13.44	14.87	14.15
(95% CI)	Grade	(4.96–19.20)	(5.83–21.43)	(6.17–28.23)	(8.59–18.29)	(7.35–22.38)	(9.68–18.62)
Head/Neck	7th	10.09	5.97	8.03	10.47	6.77	8.62
Injury Rate	Grade	(5.01–15.17)	(0.89–11.05)	(0.55–15.51)	(5.93–15.00)	(3.07–10.48)	(5.69–11.55)
(95% CI)	8th	7.95	13.00	19.29	10.30	16.14	13.22
	Grade	(2.66–13.24)	(7.21–18.79)	(11.10–27.48)	(6.60–14.00)	(10.41–21.88)	(9.81–16.64)

Note: All injury rates are expressed as injuries per 1000 Athlete Exposures; 95% CI = 95% Confidence Interval for the mean presented; FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons. Current FP = All teams currently using Fair Play rules, regardless of their group assignment. Current Std = All teams currently using standard rules, regardless of their group assignment; *n* = 13 for FP-FP, 13 for Std-FP, 6 for Std-Std, 16 for Current FP 7th Grade, 24 for current Std 7th Grade, 24 for current FP 8th Grade, and 10 for current Std 8th Grade.

the 8th grade season while the rate for the remaining groups decreased, resulting in the FP-FP group opponents having the highest overall injury rate for the 8th grade season. The opposite pattern was evident in the rates at which teams' opponents sustained more than nuisance and head/neck injuries; although the FP-FP opponents had the highest rate of these injuries during the 7th grade season, a considerable decrease for the FP-FP opponent's rate, combined with increases for the remaining groups' rates resulted in the FP-FP opponents having the lowest rate of more than nuisance and head/neck injuries during the 8th grade season.

Research question 4. The fourth research question for the current study addressed the potential mediational role of sportsmanship behavior on the relation between the Fair Play intervention and injury rates (see Figure 7). Six models were fitted to show the effect of the Fair Play intervention while controlling for the impact of sportsmanship behavior (i.e., Fair Play penalty yards per game): once again three models for the rate of overall, more than nuisance, and head/neck injuries sustained and three more for the rate of overall, more than nuisance, and head/neck injuries for a team's opponents.

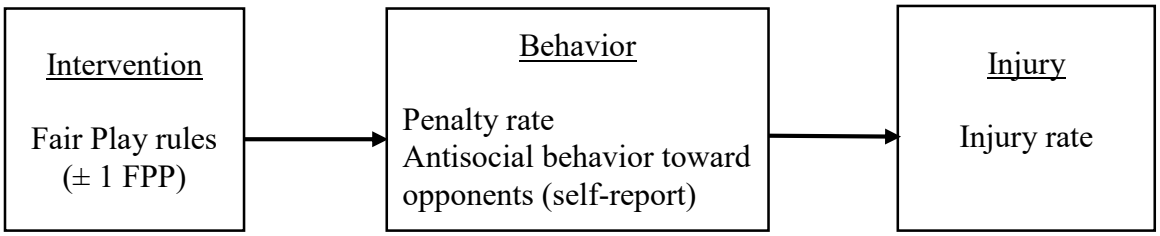

Figure 7. Research question 4 within the integrated behavioral model of sport injury interventions.

Injuries sustained. The models for injuries sustained showed no significant differences between groups for the rate of overall, $F(2,8.59) = 1.02$, $p > .05$, partial $\eta^2 = .05$, more than nuisance, $F(2,8.67) = 1.58$, $p > .05$, partial $\eta^2 = .05$, or head/neck injuries, $F(2,8.00) = 0.75$, $p > .05$, partial $\eta^2 = .25$. There were also no significant differences between the 7th and 8th grade seasons for the rate of overall, $F(1,15.52) = 0.14$, $p > .05$, partial $\eta^2 = .00$, more than nuisance, $F(1,5.93) = 1.29$, $p > .05$, partial $\eta^2 = .06$, or head/neck injuries, $F(1,8.00) = 0.31$, $p > .05$, partial $\eta^2 = .00$. There was a significant group by year interaction for overall injury rates, $F(2,14.79) = 4.27$, $p < .05$, partial $\eta^2 = .16$ (see Figure 8), but this interaction was not significant for the rate of more than nuisance, $F(2,5.99) = 1.75$, $p > .05$, partial $\eta^2 = .10$, or head/neck injuries, $F(2,8.00) = 0.93$, $p > .05$, partial $\eta^2 = .00$.

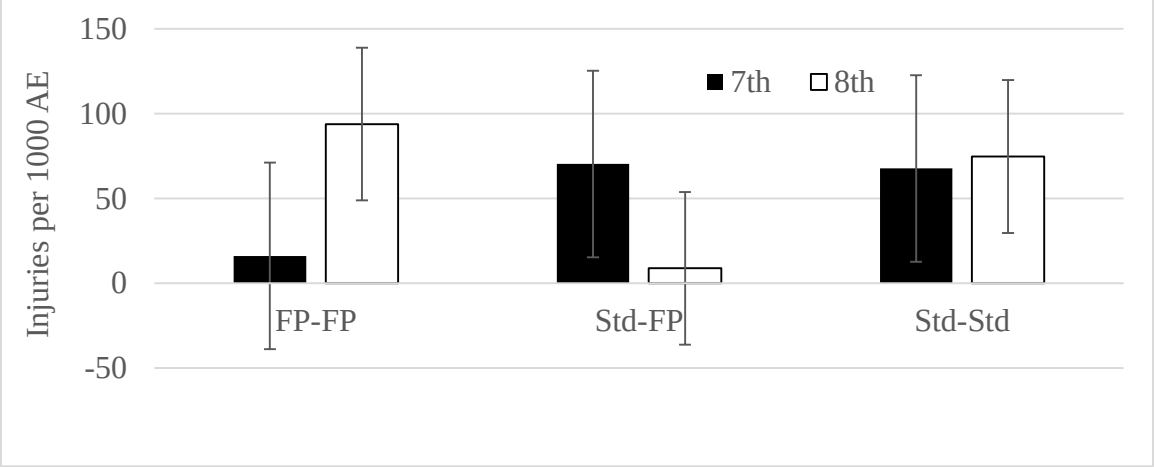

Figure 8. Rates of sustained injuries separated by study group. There was a significant group by time interaction, but no other comparisons were statistically significant.

The estimated marginal means for the rates of injuries sustained in each group when accounting for Fair Play penalty yards per game can be found collapsed across year to show overall group differences in Table 18, and separated by year to show changes over time for each group in Table 19. Though none of the group differences were

Table 18

Estimated Marginal Means of Injuries Sustained by Group, Collapsed Across Years and Controlling for Fair Play Penalty Yards Per Game

	Overall Injury Rate	(95% CI)	More than Nuisance Injury Rate	(95% CI)	Head/Neck Injury Rate	(95% CI)
FP-FP	54.96	(30.33–79.60)	7.40	(-4.57–19.37)	10.49	(0.50–20.47)
Std-FP	39.61	(8.33 –70.89)	12.42	(-3.45–28.29)	9.58	(-3.84–22.99)
Std-Std	71.19	(35.46–106.92)	22.72	(7.66–37.78)	2.75	(-9.72–15.21)
Current FP	43.33	(26.83–59.84)	8.52	(2.51–14.54)	11.10	(5.90–16.30)
Current Std	50.94	(30.72–71.16)	15.05	(7.68–22.42)	5.41	(-0.96–11.78)

Note: All injury rates are expressed as injuries per 1000 Athlete Exposures; 95% CI = 95% Confidence Interval for the mean presented; FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons. Current FP = All teams currently using Fair Play rules, regardless of their group assignment. Current Std = All teams currently using standard rules, regardless of their group assignment; *n* = 13 for FP-FP, 13 for Std-FP, 6 for Std-Std, 16 for Current FP 7th Grade, 24 for current Std 7th Grade, 24 for current FP 8th Grade, and 10 for current Std 8th Grade.

Table 19

Estimated Marginal Means of Injuries Sustained by Group, Year, and Injury Type, Controlling for Fair Play Penalty Yards Per Game

	Season	FP-FP	Std-FP	Std-Std	Current FP	Current Std	Total
Overall	7th	16.10	70.30	67.67	25.48	57.01	41.25
Injury Rate	Grade	(-39.86–72.05)	(34.58–106.03)	(22.62–112.73)	(-14.06–65.03)	(35.51–78.51)	(23.95–58.55)
(95% CI)	8th	93.83	8.82	74.70	61.19	44.84	53.03
	Grade	(59.48–128.18)	(-46.53–64.37)	(31.95–117.45)	(37.50–84.87)	(16.16–73.58)	(34.93–71.13)
More than	7th	-8.72	16.35	18.21	2.35	12.62	7.48
Nuisance	Grade	(-39.01–21.57)	(-0.25–32.94)	(-1.52–37.94)	(-12.07–16.76)	(4.78–20.45)	(1.18–13.79)
Injury Rate	8th	23.52	8.49	27.23	14.69	17.48	16.09
(95% CI)	Grade	(7.34–39.69)	(-21.10–38.07)	(8.14–46.32)	(6.07–23.33)	(7.02–27.95)	(9.49–22.69)
Head/Neck	7th	1.69	10.41	3.24	7.77	5.40	6.58
Injury Rate	Grade	(-23.99–27.37)	(-3.73–24.54)	(-13.80–19.86)	(-4.69–20.23)	(-1.38–12.17)	(1.13–12.03)
(95% CI)	8th	19.28	8.75	2.25	14.43	5.43	9.93
	Grade	(5.39–33.17)	(-16.60–34.10)	(-13.92–18.42)	(6.97–21.89)	(-3.62–14.47)	(4.22–15.63)

Note: All injury rates are expressed as injuries per 1000 Athlete Exposures; 95% CI = 95% Confidence Interval for the mean presented; FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons. Current FP = All teams currently using Fair Play rules, regardless of their group assignment. Current Std = All teams currently using standard rules, regardless of their group assignment; *n* = 13 for FP-FP, 13 for Std-FP, 6 for Std-Std, 16 for Current FP 7th Grade, 24 for current Std 7th Grade, 24 for current FP 8th Grade, and 10 for current Std 8th Grade.

statistically significant, the mean values suggest the Std-Std group sustained the highest rate of overall injuries (rate was lowest for the Std-FP group) and more than nuisance injuries (rate was lowest for the FP-FP group), but the lowest rate of head/neck injuries (rate was highest for the FP-FP group, slightly above the rate for the Std-FP group). When separated by year, the means highlight the significant group by year interaction for overall injuries, with the FP-FP group having a considerably lower rate than the other two groups during the 7th grade, but a considerably higher rate than the remaining groups during the 8th grade. A similar, but not statistically significant, pattern emerged for head/neck injuries. The pattern was more complex for more than nuisance injuries, with the FP-FP group having the lowest estimated rate during the 7th grade, which increased above the rate for the Std-FP group during the 8th grade season. The Std-Std group had the highest rate of more than nuisance injuries during both seasons.

Opponent injuries. Just as with research question 3, these models were also fitted for the rate at which teams' opponents sustained injuries. These models showed no significant differences between groups in terms of the rate of overall, $F(2,8) = .11$, $p > .05$, partial $\eta^2 = .04$, more than nuisance, $F(1,26.80) = .18$, $p > .05$, partial $\eta^2 = .06$, or head/neck injuries for opponents, $F(2,8.25) = 1.65$, $p > .05$, partial $\eta^2 = .09$. There were also no significant differences in the rate of overall, $F(1, 8) = 0.02$, $p > .05$, partial $\eta^2 = .01$, more than nuisance, $F(41,23.15) = 1.39$, $p > .05$, partial $\eta^2 = .03$, or head/neck opponent injuries, $F(1,7.94) = 4.05$, $p > .05$, partial $\eta^2 = .01$, based on year. Similarly, no

group by year interactions were statistically significant (overall injury rate partial η^2 =.02; more than nuisance injury rate partial η^2 =.12; head/neck injury rate partial η^2 =.22).

The estimated marginal means for rates of opponent injuries by each group when accounting for Fair Play penalty yards per game can be found collapsed across year to show overall group differences in Table 20, and separated by year to show changes over time for each group in Table 21. Though none of the group differences were statistically significant, the mean values suggest the Std-Std group opponents had the lowest rate of overall injuries (followed by the FP-FP group), the FP-FP group opponents had a considerably higher rate of more than nuisance injuries than the other two groups, but the FP-FP group opponents also had the lowest rate of head/neck injuries.

Table 20

Estimated Marginal Means of Opponent Injuries by Group, Collapsed Across Years and Controlling for Fair Play Penalty Yards Per Game

	Overall Injury Rate (95% CI)	More than Nuisance Injury Rate (95% CI)	Head/Neck Injury Rate (95% CI)
FP-FP	48.59 (-1.39–98.56)	26.63 (5.52–47.74)	4.36 (-4.37–13.09)
Std-FP	59.75 (-0.40–119.90)	5.43 (-4.89–15.75)	17.44 (6.95–27.93)
Std-Std	42.49 (-7.90–92.88)	9.52 (0.72–18.32)	9.82 (1.01–18.63)
Current FP	49.58 (24.39–74.76)	18.68 (0.85–36.50)	8.67 (3.27–14.08)
Current Std	49.69 (22.77–76.62)	13.24 (-0.79–27.27)	14.19 (7.56–20.81)

Note: All injury rates are expressed as injuries per 1000 Athlete Exposures; 95% CI = 95% Confidence Interval for the mean presented; FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons. Current FP = All teams currently using Fair Play rules, regardless of their group assignment. Current Std = All teams currently using standard rules, regardless of their group assignment; *n* = 13 for FP-FP, 13 for Std-FP, 6 for Std-Std, 16 for Current FP 7th Grade, 24 for current Std 7th Grade, 24 for current FP 8th Grade, and 10 for current Std 8th Grade.

Table 21

Estimated Marginal Means of Opponent Injuries by Group, Year, and Injury Type, Controlling for Fair Play Penalty Yards Per Game

	Season	FP-FP	Std-FP	Std-Std	Current FP	Current Std	Total
Overall	7th	58.87	53.85	46.34	57.83	50.58	54.21
Injury Rate	Grade	(-58.06–175.81)	(-5.32–113.03)	(-27.07–119.76)	(12.15–103.52)	(23.40–77.75)	(34.96–73.45)
(95% CI)	8th	38.30	65.64	38.64	41.32	48.81	45.07
	Grade	(-19.12–95.72)	(-46.55–177.83)	(-23.45–100.72)	(12.37–70.27)	(16.80–80.82)	(24.21–65.92)
More than	7th	51.39	1.02	12.29	29.46	8.22	18.84
Nuisance	Grade	(-33.71–136.49)	(-5.28–6.30)	(-20.98–45.56)	(7.63–51.30)	(-4.88–21.32)	(10.44–27.24)
Injury Rate	8th	1.87	9.83	17.82	7.90	18.26	13.08
(95% CI)	Grade	(-15.63–19.37)	(-2.81–22.47)	(-12.13–47.77)	(-3.42–19.21)	(4.21–32.32)	(3.69–22.47)
Head/Neck	7th	3.39	4.74	3.30	7.58	10.68	9.13
Injury Rate	Grade	(-17.00–23.78)	(-5.58–15.06)	(-9.53–16.12)	(-5.37–20.53)	(3.64–17.72)	(3.46–14.80)
(95% CI)	8th	5.32	30.13	16.34	9.77	17.69	13.73
	Grade	(-4.69–15.33)	(10.59–49.67)	(5.51–27.17)	(2.01–17.52)	(8.29–27.10)	(7.80–19.66)

Note: All injury rates are expressed as injuries per 1000 Athlete Exposures; 95% CI = 95% Confidence Interval for the mean presented; FP-FP = Group using Fair Play rules for both seasons; Std-FP = Group using standard rules in 7th grade and Fair Play rules in 8th grade; Std-Std = Group using standard rules for both seasons. Current FP = All teams currently using Fair Play rules, regardless of their group assignment. Current Std = All teams currently using standard rules, regardless of their group assignment; *n* = 13 for FP-FP, 13 for Std-FP, 6 for Std-Std, 16 for Current FP 7th Grade, 24 for current Std 7th Grade, 24 for current FP 8th Grade, and 10 for current Std 8th Grade.

When separated by year, the means show the overall rate for opponent injuries was highest for the FP-FP group during the 7th grade, but decreased considerably to the 8th grade season, leading to the FP-FP group having the lowest rate of overall opponent injuries during the 8th grade (the highest rate was for the Std-FP group). A similar pattern emerged for the rate of more than nuisance opponent injuries, with the FP-FP group moving from the highest rate during the 7th grade season to the lowest rate during the 8th grade season (highest rate was for the Std-Std group during the 8th grade season). Finally, all groups showed increased rates for opponent head/neck injuries from the 7th to 8th grade seasons, but the Std-FP group had the highest rate among the three groups for both seasons.

Taken together, the models fit for the present study did not provide support for observed sportsmanship behavior, in the form of observed Fair Play penalty yards per game, mediating the relationship between the Fair Play intervention and various types of injury outcomes (for the team or their opponent). This conclusion is based on the lack of evidence for a significant direct effect of the intervention on any of the injury rate categories; therefore, there was no relation to be mediated. Furthermore, the small effects that did exist were largely unaffected by accounting for Fair Play penalty yards per game (the largest change in effect size was .03).

Questionnaire Data Analysis

The community-based nature of this study contributed to inconsistencies in questionnaire completion across individual participants — only nine participants

completed questionnaires at all four time-points — which precluded the use of longitudinal analyses of these data. Therefore, research questions 2 ("do youth football players on teams using Fair Play rules self-report less antisocial behavior toward opponents than players on teams using standard rules?") and 5 ("do athlete self-reported sportsmanship attitudes and/or athletes' perception of their coach's sportsmanship behavior moderate the relationship between Fair Play rules and athlete sportsmanship behavior?") were not addressed longitudinally, as the other research questions have been.

However, a one-way multivariate analysis of variance (MANOVA) was conducted to address both research question 2 and research question 6 ("after two seasons, are there differences in athlete self-reported sportsmanship attitudes and athletes' perceptions of their coach's sportsmanship behavior between teams who have used Fair Play rules and those who have not?"). The independent variable for this analysis was study group (FP-FP, Std-FP, or Std-Std) with dependent variables of individual participants' 8th grade post-season questionnaire data for athlete self-reported antisocial behavior toward opponents, athlete self-reported attitude toward cheating, and athlete's perceptions of their coach's sportsmanship behavior. The gamesmanship subscale of the AMDYSQ was not used because of its poor internal consistency in this sample. Prior to conducting the analysis, the data were checked for the statistical assumptions of a MANOVA (Tabachnick & Fidell, 2007). The assumptions of homogeneity of the covariance matrices, multicollinearity, and linearity were met; there were also no outliers on any of the outcome variables and a sufficient number of cases per cell for five

dependent variables. However, the results should be interpreted with caution because a positive skew in athletes' self-reported antisocial behavior toward opponents data and negative skew in athletes' self-reported attitudes toward cheating and perceptions of the coach modeling good sportsmanship behavior resulted in the assumption of multivariate normality of dependent variables not being met.

A discriminant function analysis to follow-up a significant MANOVA was planned to identify the combination of factors that best separated the three study groups; however, the omnibus test was non-significant (Wilk's $\Lambda = .49$, $F(12,26) = .93$, $p > .05$), so no follow-up tests were conducted. This result shows there were no differences in athlete self-reported antisocial behavior toward teammates, self-reported attitude toward cheating, and athletes' perceptions of their coach's sportsmanship behavior between groups by the end of the 8th grade season.

CHAPTER FOUR

Discussion

The first purpose of this study was to determine whether youth American football teams using Fair Play rules exhibit better athlete sportsmanship behavior (both in-game penalty observations and athlete self-report) and experience lower injury rates than teams using standard rules. Although there were no statistically significant differences in terms of penalties incurred between teams using Fair Play rules compared to those using standard rules, there was a trend in which the FP-FP group committed fewer Fair Play penalty yards per game during the 7th grade season, although this was not true during the 8th grade season. Similarly, no statistically significant differences in injury rates emerged between intervention groups when controlling for Fair Play penalties per game (the FP-FP group did sustain a significantly higher rate of head/neck injuries than the Std-Std group when not accounting for penalties), but closer examination of the data revealed potential patterns worth future investigation.

Although the variability from one season to the next made trends difficult to identify when comparing the injury rates between groups for individual seasons, the injury rates for the groups over the length of the study provided interesting patterns. For example, when looking at injury rates in isolation, the teams using Fair Play rules for two years had the highest rate of overall, more than nuisance, and head/neck injuries. However, looking at a more complete picture of the sport-related injury environment, by controlling for a team's mean number of Fair Play penalty yards per game, the teams

using standard rules for two years had the highest rates of overall and more than nuisance injuries. Additionally, when looking at changes within groups over time, there was a significant interaction between group and time for overall injuries sustained when controlling for Fair Play penalty yards per game. Specifically, the FP-FP group had the lowest overall injury rate during the 7th grade season but the highest during the 8th grade season, whereas the Std-FP group had the highest injury rate during the 7th grade season but the lowest during the 8th grade season (with the Std-Std group being slightly below the highest rate group during both seasons). This finding provides partial support for the value of Fair Play rules, with the teams using Fair Play rules during the 7th grade season having the lowest overall injury rate, Std-FP group having a considerable decline in overall injury rate when switching to Fair Play rules for the 8th grade season, and the Std-Std group being near the highest overall injury rate for both seasons; however, the increase in the overall injury rate for the FP-FP group during the 8th season does not support this conclusion.

Additional patterns were observed when comparing teams based on the current rule system they were using, regardless of group assignment. The rate at which teams currently using Fair Play rules and their opponents sustained injuries was near, or slightly higher than, teams currently using standard rules for overall injuries, more than nuisance injuries, and head/neck injuries for both the 7th and 8th grade seasons. The only exception to this pattern was the rate of opponent head/neck injuries for the 8th grade season, which

was roughly 60% higher for teams using standard rules, suggesting that exposure to Fair Play rules may reduce the risk of catastrophic injuries for a team's opponents.

These patterns changed when controlling for the effect of Fair Play penalties incurred by a team (see Tables 19 and 21). Teams currently using Fair Play rules had considerably lower rates of overall and more than nuisance injuries than teams currently using standard rules during the 7th grade season, but considerably higher rates of overall injuries during the 8th grade season (but the rate of more than nuisance injuries remained slightly lower for the teams using Fair Play rules). Additionally, the rate of head/neck injuries went from slightly higher for the teams using Fair Play rules in the 7th grade season to much higher than the teams using standard rules in the 8th grade season. Similarly, the trends detected for the rate at which teams' opponents sustained injuries changed considerably after controlling for Fair Play penalty yards incurred per game. Opponents of teams currently using Fair Play rules had a higher rate of overall and more than nuisance injuries than teams currently using standard rules during the 7th grade, but these rates dropped considerably for teams using Fair Play rules during the 8th grade season, resulting in a lower rate than the teams using standard rules. Lastly, for the 7th and 8th grade seasons, opponents of teams using Fair Play rules also had a lower rate of head/neck injuries than teams using standard rules. While these patterns present a complicated picture of the impact Fair Play rules have in youth American football, they do suggest that teams using different rules (Fair Play or standard) are exposed to different levels of injury risk. Based on how the injury rates changed, it is evident that athlete

sportsmanship behavior — in the form of Fair Play penalty yards per game — affects athlete injury risk as well. Furthermore, these results provide the first evidence that once teams have had a chance to adapt to Fair Play rules for one season, their opponents appear to be at a lower risk of sustaining an injury than if the team had not used Fair Play rules before.

The second purpose of this study was to provide a mechanistic understanding of how the Fair Play intervention influences injury rates. More specifically, research question 4 aimed to determine whether sportsmanship behavior mediated the potential effect of the Fair Play intervention on injury rates, and research question 5 aimed to determine if environmental (i.e., coach behavior) and/or personal (i.e., sportsmanship-related attitudes) moderated the intervention's effect on athlete sportsmanship behavior. However, questions regarding mediation and moderation were not explored statistically because there were no statistically significant changes to penalty or injury rates as a result of study condition — in essence there were no significant effects to be mediated or moderated. Despite these findings, controlling for penalty rates did have a noticeable impact on injury rates. These observations suggest that a portion of injuries may be associated with poor sportsmanship behavior, as previous research has found (Collins et al., 2008) — and that future research should consider how this behavior may impact the effectiveness of an intervention.

In addition to attempting to address the research purposes stated above, the present study also addressed several gaps in the literature. First, this study

simultaneously evaluated an intervention's effect on moral behavior in sport and injury risk rather than looking at the two in isolation. Importantly, unlike many previous interventions (see McGlashan & Finch, 2010) the present study was conducted with an intervention and research questions that were theory-based — relying on elements of social cognitive theory (Bandura, 1986), Verhagen et al.'s (2010) behavioral injury risk model, and operant conditioning. Structuring an intervention around theory is critically important because it provides a strong, evidence-based framework from which researchers can choose relevant constructs and intentionally develop an intervention. Not only does this provide a strong rationale for the intervention, but provides a context through which the results can be interpreted. The longitudinal design employed in this study also sets it apart from many sport-related injury intervention studies, as most researchers have relied on cross-sectional designs. Longitudinal research in sport-related injury research is valuable because it can provide evidence for an interventions' effectiveness as participants age rather than comparing two (or more) different groups of participants. Lastly, unlike many of the evaluations of Fair Play rules in ice hockey, the present study was conducted with a control group that continued using the standard rules for the sport. Including a control group is another essential element of sport-related injury intervention research because it enables comparisons that strengthen the argument that changes in injury rates (for example) were a result of the intervention and not spurious.

ABA Principles in the Present Study

In addition to the formal research purposes stated above, the current study provides a prime example of how sport-related injury interventions can be guided by the principles of ABA (Baer et al., 1968). The first of these principles is that the intervention be focused on behavior that is applied in nature, meaning it is both socially acceptable and important. As outlined previously, at least 39 million youth (high school or younger) participate in organized sport each year (Centers for Disease Control and Prevention, 2014; United States Census Bureau, 2014), and injuries are an inherent risk in sport participation. Therefore, attempting to reduce behavior that could lead to injuries (i.e., poor sportsmanship) is both important and socially acceptable. Secondly, the current study focused on creating behavioral change (though differences in sportsmanship-related attitudes were addressed as an additional research question, the intervention did not target psychological variables). The behavior of interest for this study was observed sportsmanship-related behavior, with changes in sport-related injury rates predicted as a side-effect of this behavioral change. The third principle dictates that experimental designs that provide strong evidence that an intervention is responsible for behavioral change be used. For this reason, the present study utilized a multiple-baseline design in which groups were sequentially converted to using Fair Play rules. This design allowed for comparisons among three groups with different exposure to Fair Play rules and provided the opportunity for convincing evidence that changes in behavior were a result of the intervention. The data from this study show that that despite the FP-FP group

having a slightly lower average for Fair Play penalty yards per game in the 7th grade season, the effect was not reproduced when the Std-FP group began using Fair Play rules during the 8th grade season. In fact, both the Std-FP and FP-FP groups had greater increases in Fair Play penalty yards per game from the 7th to 8th grade (and higher mean values during the 8th grade season) than the Std-Std group.

The fourth and fifth principles of ABA-based interventions (Baer et al., 1968) are that they thoroughly describe procedures (they are "technological") and based on supported theory (they are "conceptually systematic"). The operational definitions, intervention, research assistant training, and data collection procedures are all clearly outlined in the "Method" section. The current study also relied on the well-established principles of operant conditioning in the form of Fair Play points, which were earned when teams stayed under a specified penalty limit (reinforcement for good sportsmanship) or taken away when the penalty limit was exceeded by too much (punishment for poor sportsmanship).

Next, researchers using ABA-based interventions must demonstrate the effectiveness of their interventions (Baer et al., 1968). To do this, they typically do not rely on inferential statistics and instead base their decisions on visual inspections of their data and professional opinions of what a practically significant effect would be. For the present study, the estimated marginal means provided a more detailed understanding of potential intervention effects, as discussed above. The practical impacts suggested by these means would be substantial in relation to the injury rates found in this study. For

example, based on the means when accounting for Fair Play penalty yards per game, teams using Fair Play rules during the 7th grade experienced roughly one-sixth the rate of more than nuisance injuries per 1000 AEs compared to teams using standard rules. Practically speaking, this translates to an average of five fewer injuries that restricted an athlete for at least one game per season for teams using Fair Play rules compared to teams using standard rules.

The final principle of interventions grounded in ABA is that the findings should be generalizable to alternative settings or impact behavior related to the targeted behavior. While the present study did not directly evaluate this principle, follow-up studies could be done to determine if players who were exposed to Fair Play rules exhibit better sportsmanship behavior in other sports that do not use Fair Play rules (e.g., generalization to basketball), or in future American football participation once Fair Play rules are no longer in effect (e.g., behavioral retention in 9th grade American football). Additionally, future work could expand the focus of this study and examine not only whether Fair Play rules influence negative behavior toward opponents, but related behavior such as negative behavior toward teammates or even positive behavior toward opponents (both of which are subscales of the PABSS).

Findings on Injury Rates

Despite the number of studies that have provided data on injury rates for organized sport, the majority of these studies have focused on collegiate and high school athletes, for whom data are readily available. Additionally, no previous studies have

reported opponent injury rates, a critical addition for determining the effectiveness of behavioral interventions such as Fair Play rules. This study contributes to the literature a detailed report of injuries sustained and injury rates for athletes in youth American football as well as their opponents. Of the previous studies on the injury rate for youth American football players, the overwhelming majority use injury definitions that require diagnosis by a certified athletic trainer and at least one day of activity restriction (Beachy & Rauh, 2014; Dompier, Powell, Barron, & Moore, 2007; Malina et al., 2006; Tuberville, Cowan, Asal, Owen, & Anderson, 2003, 2003). The lowest competition injury rates reported for these studies, 8.84/1000 AE, was an average of athletes from grades 6–8 (Tuberville et al., 2003); this was followed by a rate of 15.02/1000 AE reported by Beachy and Rauh (2014), but this was also an average for athletes in grades 7–9. Injury rates specific to 7th grade athletes were 26.1/1000 AE (Malina et al., 2006) and 29.6/1000 AE (Dompier et al., 2007), both of which increased slightly to 27.4/1000 AE (Malina et al., 2006) and 32.3/1000 AE (Dompier et al., 2007) for the 8th grade teams. The injury definition used by these studies most closely matches the "more than nuisance injury" category for the current study, although rates generated by the more restrictive definition (requiring a certified athletic trainer) should be more conservative than the current study. Despite this, the more than nuisance rates for teams currently using standard rules in this study were 8.95/1000 AE in the 7th grade and 11.22/1000 AE in the 8th grade; both of which are considerably lower than the rates reported by Beachy and Rauh (2014), Malina et al. (2006), and Dompier et al. (2007). However, the overall injury rates are consistent

with previous research when comparisons are made with research that used the same injury definition as the current study (and also did not have access to certified athletic trainers). For example, Radelet et al. (2002) reported an overall competition injury rate (including nuisance injuries) of 43/1000 AE for youth American football, which is in line with the 48.88/1000 AE (7th grade) and 41.78/1000 AE (8th grade) in the current study.

To our knowledge, the present study is also the first to report the rate at which teams' opponents sustained injuries, regardless of age or level of sport participation. This alternative perspective is critically important for studies designed to modify behavior that leads to injury. For example, in the present study, while some behavior that would be identified as poor sportsmanship would put both the aggressor and the target at risk of injury (e.g., spearing), others are considerably more dangerous for the athlete being fouled (e.g., roughing the kicker, facemask). Although generally consistent with the sustained injury rates, teams' opponent injury rates were often slightly higher for all groups, particularly for more than nuisance and head/neck injuries.

Limitations

Although this study extended previous research and made important contributions to the literature on sport-related injury in youth athletes and interventions to reduce injury risk, there were also several limitations. The first limitation was sampling. Because observational data were gathered at the team level, there were only 13 cases in the FP-FP group, 13 in the Std-FP group, and 6 in the Std-Std group. The small sample, combined with considerable variability in the data, greatly reduced the study's power to detect

significant differences and resulted in widespread confidence intervals. A power analysis calculation revealed that a sample size of 100 teams would be required to detect a small effect using linear mixed models for the current study. However, in line with the principles of ABA-based studies, statistically significant differences were not the only source of valuable information to be gained. For example, several practically meaningful changes were detected in terms of injury rates even though they were not statistically significant.

Additionally, all league participants were at an age during which puberty often begins, creating the possibility for dramatically discrepant body types between participants, which could have also contributed to the variability in the data. For example, penalty data could have been affected if there were cases in which less physically mature participants were tasked with defending or blocking a more physically mature participant, but they had to commit a penalty such as holding or pass interference in order to accomplish their goal. Injury data could have also been impacted if there were collisions between the larger (possibly faster and more muscular) early-maturing participants and the smaller, later-maturing participants. There could also be considerable temporal context differences that could shift attitudes from the 7th to the 8th grade. One important change during this period was that 8th grade participants were only one year away from being eligible for high school varsity football and may have been more tempted to "win at all costs" than their 7th grade counterparts. Without explicitly

addressing these developmental considerations, we can only speculate about their potential to affect the data.

A third important limitation was the inconsistency with which participants completed the study questionnaires — in fact, only nine participants completed the study questionnaires at all four time-points. Though this inconsistency in one of the limitations inherent in community-based research (Minkler, 2005), it eliminated the possibility of conducting longitudinal analyses with these data. Although all coaches were contacted several times to schedule questionnaire completion, some were unresponsive and others did not relay the message to their team. Additionally, even if a coach was responsive and assisted in coordinating a time for questionnaires to be completed, they could not guarantee athletes would be there and agree to complete the study measures. There were also teams that had very few practices for us to complete questionnaire data collection, and others where inclement weather prevented data collection.

A fourth limitation, also related to the community-based nature of the present study, was ensuring all parties involved in the league were well-informed of the intervention. The size of the league used in this study presented a problem in this regard. For example, because there were roughly 40 teams each year of the study, this meant there were over 100 coaches/assistant coaches and 1000 athletes who needed to know the details of the Fair Play rules and how they could impact season standings. Unfortunately, this prevented individual or small group meetings to review the Fair Play rules; however, all coaches were provided this information verbally once per season at a pre-season

organizational meeting and in written format each year through the league handbook. Despite these efforts, there were still coaches who called near the end of the season asking how the Fair Play system worked and how their team would be affected.

Fifth, because questionnaires were completed by several participants at once, often with only one researcher present, at times it was difficult to keep the participants from talking to one another while completing the questionnaire. While all research assistants were trained to inform participants to complete the measures on their own, these conversations could have unintentionally influenced their responses, or at a minimum prevented them from fully focusing on the questions they were being asked.

There were also limitations to the measures used in the current study. The first of these limitations was the lack of certified athletic trainers to diagnose injuries at games. Thus, although consistent with other sport-related injury research (Radelet et al., 2002), we used a broad definition of injury that enabled observational measurement. Therefore, injury rates presented from unofficial observation of potential injuries in the absence of professional verification. This also meant that we were not able to verify injury severity beyond players not participating in subsequent games (which may or may not have been the result of an injury). Additionally, practical limitations prohibited us from reporting injury rates per individual exposure time. This approach would have required at least two to three research assistants to attend every game, which would have greatly reduced the number of games that could be observed. Although several games were video recorded, the size of the football field and frequent lack of bleachers to provide wide-angle views

of the field prevented calculating individual exposure time injury rates using these videos as well. Again, despite this limitation, we were still able to calculate injury rates per 1000 AEs, a commonly used metric in the existing literature, which aids in drawing comparisons to previous research.

In terms of limitations with the questionnaires used in the present study, although Lee et al. (2007) and Ntoumanis, Taylor, and Thøgersen-Ntoumani (2012) provided support for the AMDYSQ among diverse adolescent samples, and the current study showing acceptable or better reliability and validity for the Acceptance of Cheating and Acceptance of Gamesmanship subscales, few published studies have adopted this measure, though it has been used repeatedly in unpublished works, primarily with European samples (see Whitehead & Ntoumanis, 2013). Additionally, participants were asked to self-report their antisocial behavior toward opponents and attitudes toward cheating and gamesmanship — all constructs that are susceptible to social desirability effects. Furthermore, from a practical standpoint, the repetitive nature of some measures appeared to frustrate some participants as researchers were often asked why the participants had to answer the same question repeatedly. Finally, although the current study focused on coach sportsmanship behavior and athlete attitudes about sportsmanship as the environmental and personal factors of interest, respectively, there are many other factors that could influence the effectiveness of an intervention such as Fair Play, but these were not controlled for or assessed in the present study. These factors include, but are not limited to motivational climate, team norms (e.g., Stephens, 2000, 2001; Stephens

& Bredemeier, 1996; Stephens et al., 1997; Stephens & Kavanagh, 2003), moral atmosphere (e.g., Guivernau & Duda, 2002; Kavussanu et al., 2002; Long et al., 2006; Miller et al., 2005), and moral identity (Kavussanu et al., 2013).

Future Directions

Future research in this area could address these limitations, and continue to advance the literature on sport-related injury interventions in several ways. Although the cost was prohibitive for the current study, some leagues have certified athletic trainers present at all games. Official reports of injuries from an athletic trainer would provide more detailed, valid, and reliable information on injuries sustained. Replicating the current study in smaller youth football leagues would require fewer certified athletic trainers and present a realistic opportunity for having certified athletic trainers at all games. This, as well as possibly partnering with researchers specializing in sport medicine, could greatly improve injury assessments.

In addition to alternative means of measuring injuries, alternatives to self-reported questionnaires could help combat the potential for socially desirable responding. For example, the three referees for a game could each provide a sportsmanship score for the two teams and/or researchers could directly observe coaching behaviors using the Coaching Behavior Assessment System (R. E. Smith, Smoll, & Hunt, 1977). However, if data are collected through questionnaires in the future, researchers must consider alternative strategies to ensure more consistent participant completion. One such strategy would be to develop, evaluate the psychometric properties of, and utilize abbreviated

measures for community-based research. This approach appears warranted given the number of participants and coaches expressing frustration with the length and occasional repetitiveness of questionnaires.

An additional strategy that could help with some of these limitations and others, recommended by A. M. Smith et al. (2013), is to create Fair Play liaisons for each team. This liaison would need to be someone (likely a parent) who is not a coach, but is present at each game. This person would be able to undergo more intensive training on Fair Play and regularly check-in with the researchers, while also remaining in close contact with their respective team. Team liaisons could help reduce confusion among coaches, simplify the process of questionnaire completion, and promote independent completion of study questionnaires. In addition to creating team liaisons, replicating the current study in a smaller league could also help address several of these limitations.

An additional modification that could be made to the Fair Play program is modifying the intervention description provided for the league, coaches, parents, and players to evaluate the effect of message framing (Tversky & Kahneman, 1981). The work on message framing has demonstrated that the choices people make about their behavior can be manipulated by presenting options in terms of the associated benefits ("gain frame") or costs ("loss frame"). In this study, the Fair Play rules outlined how sportsmanship-related behavior could either cause teams to gain or lose points toward season standings. However, the rules could be restructured to emphasize gaining or losing points (earn/lose 0, 1 or 2 points each game) and the message could be re-framed

to highlight this and the impact on teams making the playoffs. Given the complicated applied nature of sport, rather than a controlled lab experiment, several external factors could influence the behavioral choices athletes make, such as their experiences with sportsmanship, injury, and the playoffs, and social agents such as their coaches, teammates, parents, opponents, and the officials (Gallagher & Updegraff, 2012; Rothman & Salovey, 1997).

Beyond addressing the limitations of the current study, there are several interesting avenues researchers who choose to further this line of work could pursue. In this study, we were interested in how personal and environmental factors may have impacted the effectiveness of the Fair Play intervention. However, only attitudes toward cheating and gamesmanship (personal factors) and coach sportsmanship-related behavior (environmental factors) were considered. Future research could explore other, or additional, factors that have been shown to affect youth athletes such as their levels of moral reasoning, goal orientation, parent/spectator behavior, and teammate/peer behavior. These factors, in addition to other individual characteristics such as values and affect, are suggested as mediators between features of a situation and behavioral outcomes in Mischel and Shoda's (1995) cognitive-affective processing system (CAPS). Investigating the effect of sport-injury interventions such as Fair Play using this framework could prove incredibly informative. The complexity of the numerous interacting forces in an applied intervention study such as this lends itself to agent-based modeling (Helbing & Balietti, 2002). In this way, researchers would be able to simulate

an intervention in a social system while several personal and environmental factors are at play, and potentially determine which factors had the strongest effect and could then be tested or included as part of a modified intervention.

Future researchers could also examine several extensions of this work. This could be accomplished by evaluating how Fair Play rules affect additional behavior, such as prosocial behavior toward opponents, antisocial behavior toward teammates, or respect for officials, or other outcomes, including attrition from sport. Furthermore, modifying and implementing Fair Play rules for sports that have been found to have a larger portion of their injuries associated with illegal play than football, such as basketball (girls: 14.0% of injuries; boys: 10.3%) and soccer (girls: 11.9%; boys: 11.4%) (Collins et al., 2008) could be a valuable extension.

Conclusions

Eradicating injury from the sport experience is not a realistic objective. However, well-designed intervention studies that are grounded in theory can help protect athletes from injuries that are a result of behavior that is under our control. This study makes important contributions to the field by taking these steps for a sport that has the highest in-game injury rates. Although the results of the current study were inconclusive, there is enough evidence to suggest that more investigation into Fair Play rules in American football is warranted. Specifically, teams exposed to the Fair Play rules, on average, had lower rates of overall, risky, and sportsmanship-related penalties than teams using standard rules and opponents of teams using Fair Play rules had lower rates of overall,

more than nuisance, and head/neck injuries than teams using standard rules during the 8th grade season. Future research should address the limitations of this study and extend this work in order to create safer environments for millions of youth to enjoy their sport experiences.

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Appendix A

Pilot Study

In the year prior to beginning the present study, the Fair Play intervention and research procedures were piloted in 7th grade teams (these participants would have been in the 8th grade league during year 1 of the present study, so they were only participants in the pilot and not the present study). Thirteen teams (one of the three league divisions) used Fair Play rules as described in the "Method" above (see pages 45–49), while another nine teams were observed when using standard rules. However, during the pilot study, teams earned their Fair Play point if they committed no more than 35 yards of relevant penalties (see Appendix D on page 131).

As with the present study, data were collected by research assistants who all received the same background information and training for their involvement (see "Research Assistant Training" on pages 55–57). Penalty and injury observations were made at 104 Fair Play games (65% of the season) and 58 standard rules games (32% of the season) using tracking forms that were identical in content to the forms used in the present study (see Appendix C, pages 136–138). No video recording was conducted during the pilot study, so inter-rater reliability could not be calculated. Following the final regular season game during the pilot season, participants completed questionnaires about their sportsmanship-related behavior (Multidimensional Sportspersonship Questionnaire [MSOS]; Vallerand et al., 1997), aggressive behavior (Modified Reactive–Proactive Aggression Questionnaire for Sports [RPQ-S]; Raine et al., 2006), and injury experiences during the season (Football-Related Injury Survey adapted from Radelet et al., 2002).

Injury and penalty rates were compared between teams using Fair Play rules and teams using standard rules by conducting a one-way MANOVA. The independent variable for this MANOVA was study condition (Fair Play or standard rules) with five independent variables: Fair Play penalty yards per game, unsportsmanlike conduct penalties per game, minor injuries (i.e., the injured athlete did not participate in remainder of the game because of the injury), moderate injuries (i.e., the injured athlete did not participate for the next two to three games), and severe injuries (i.e., the injured athlete did not participate for the next four or more games). This MANOVA was not significant, Wilks' $\lambda = .674$, F (1, 20) = 2.052, $p = .132$, but there were small–medium effect sizes showing Fair Play teams having fewer unsportsmanlike penalties (partial $\eta^2 = .132$) and minor injuries (partial $\eta^2 = .109$).

A total of 28 participants completed the post-season questionnaires (M_{Age} = 12.29 years) — sixteen participants from teams using Fair Play rules and twelve participants from teams using standard rules. The self-reported sportsmanship-related and aggressive behavior of athletes on teams using Fair Play rules were compared to athletes on teams using standard rules using a one-way MANOVA. The independent variable for this MANOVA was study condition (Fair Play or standard rules) with seven independent variables: MSOS Respect for Social Conventions, MSOS Respect for Rules and Officials, MSOS Commitment to Participation, MSOS Respect and Concern for Opponents, MSOS Negative Approach, RPQ-S Proactive Aggression, and RPQ-S Reactive Aggression. This MANOVA was significant, Wilks' $\lambda = .201$, F (1, 20) =

8.933, $p < .001$; follow-up ANOVAs showed that, compared to athletes on teams that had used standard rules, athletes on teams that had used Fair Play rules reported significantly lower scores for proactive aggression, negative approach to practice, and respect and concern for opponents and significantly higher scores on respect for social conventions, respect for rules and officials, and commitment toward sport participation.

These results were promising, generally showing more positive sportsmanship outcomes in players exposed to Fair Play rules than those playing under standard rules. However, the contradictory lower score on Respect and Concern for Opponents could be a result of Fair Play participants behaving differently simply as a means to earn Fair Play points, not as a result of sustainable behavior change. Regardless, the findings from the pilot study were encouraging and provided evidence that more research on modifications to Fair Play rules is warranted.

In addition to providing tentative support for the role of Fair Play rules in sportsmanship-related behavior and injury risk in youth American football, this pilot study provided important lessons that shaped the present study. For example, drastic changes were made to the study measures and data collection processes. Because of questionable psychometric properties (MSOS) and not being developed and tested in an age-appropriate sample for the present study (RPQ-S), the questionnaires used in the pilot study were replaced by more psychometrically sound, age appropriate, and construct relevant measures for the present study. It was also intended that questionnaires would be completed at both pre-season and post-season following the pilot; however,

participants would no longer be asked to complete post-season questionnaires following their final regular season game. This process presented several issues during the pilot study (e.g., time of day on a school night, weather, patience, lighting) and resulted in a very low participation rate. These experiences led to a more proactive approach for the current study, in which post-season questionnaire completion was scheduled weeks in advance for a late season practice or post-season banquet. Observational data collection procedures were also modified following the pilot study. Additional data were collected in the form of opponent injury outcomes and video recording of games for inter-rater reliability of injury and penalty observations. The terminology regarding injuries was also modified to provide a more nuanced picture of injury rates and be more consistent with previous research. The final revision to the data collection procedure were minor, structural changes intended to simplify the observational tracking forms, although these modifications did not change the observation content.

The pilot study also provided information on necessary modifications to the Fair Play intervention for the youth American football context. During the pilot, both groups (Fair Play and standard rules) averaged fewer than 35 Fair Play penalty yards per game, so the penalty yard threshold was reduced to 30 yards to increase the reinforcement value of the Fair Play points. Also, in response to multiple games in which there was a considerable amount of poor sportsmanship behavior, the league commissioner requested the addition of a punishment for teams exhibiting particularly poor sportsmanship behavior. This request was implemented into the present study in the form of a one Fair

Play point penalty (-1 Fair Play point) for each game in which teams exceeded the Fair Play penalty threshold by 150% or more.

Appendix B

Study Questionnaires

Demographic Form

Study ID Number: _____

Age: _____

Race/ethnicity (select 1):

a) White
b) African American
c) Hispanic or Latino
d) American Indian
e) Asian/Pacific Islander
f) Multiracial
g) Prefer to not answer

Years of football played: _____ Years with this coach: _____

Positions played (if known):

_____

Do you play other sports?

a) Yes b) No

If yes, what other sports do you play?

_____

Have you had any injuries in the past?

a) Yes b) No

What did you hurt and what kind of injury was it (sprain, fracture, concussion, etc.)?

_____

Are you starting this season with any injuries?

a) Yes b) No

Please explain:

_____

Prosocial and Antisocial Behavior in Sport Scale:
(PABSS; Kavussanu & Boardley, 2009)

Below is a list of behaviors likely to occur during matches/games. Please think about your experiences while playing football this season and indicate **how often** you engaged in these behaviors **this season** by **circling** the relevant **number**. Please respond **honestly**.

Antisocial Behavior Toward Teammates Subscale:

While playing for my team **this season, I…**	**Never**	**Rarely**	**Sometimes**	**Often**	**Very Often**
1. Criticized an opponent	1	2	3	4	5
2. Deliberately fouled an opponent	1	2	3	4	5
3. Retaliated after a bad foul	1	2	3	4	5
4. Tried to wind up an opponent	1	2	3	4	5
5. Tried to injure an opponent	1	2	3	4	5
6. Intentionally distracted an opponent	1	2	3	4	5
7. Intentionally broke the rules of the game	1	2	3	4	5
8. Physically intimidated an opponent	1	2	3	4	5

Attitudes to Moral Decision making in Youth Sport Questionnaire (AMDYSQ; Lee, Whitehead, & Ntoumanis, 2007)

Below is a list of thoughts and actions likely to come up in sports. Please think about your experiences while playing football this season and answer how much you agree with each statement by **circling** the relevant **number**. Please respond **honestly**.

Cheating Subscale:

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I always play by the rules.*	1	2	3	4	5
If other people are cheating, I think I can too.	1	2	3	4	5
I cheat if I can get away with it.	1	2	3	4	5
I would cheat if I thought it would help the team win.	1	2	3	4	5
I would cheat if I thought it would help me win.	1	2	3	4	5
When I get the chance I fool the official.	1	2	3	4	5

Gamesmanship Subscale:

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I sometimes try to upset my opponent.	1	2	3	4	5
It is a good idea to upset your opponent.	1	2	3	4	5
If I don't want another person to do well then I put them off a bit.	1	2	3	4	5
I would never psyche anybody out.*	1	2	3	4	5
It is understandable that players swear in the heat of the moment.	1	2	3	4	5
Sometimes I waste time to bother my opponent.	1	2	3	4	5

Sportsmanship Coaching Behaviors Scale
(SCBS; Bolter & Weiss, 2012)

Please answer the following questions about your head coach this football season. When the question mentions good sportsmanship, we mean respecting the rules, officials, and opponents, encouraging others, and staying under control. On the other hand, poor sportsmanship includes disrespecting the rules, officials, or opponents, criticizing others, and losing self-control. Please answer honestly, your answers are anonymous and will not be shared with your coach, parents, or anyone other than the research team.

Punishes Poor Sportsmanship Subscale:

My coach for this season…	Never	Rarely	Sometimes	Often	Very Often
1. Disciplines athletes who show poor sportsmanship	1	2	3	4	5
2. Punishes athletes who show poor sportsmanship	1	2	3	4	5
3. Punishes athletes when they act like poor sports	1	2	3	4	5
4. Disciplines athletes who behave in unsportsmanlike ways	1	2	3	4	5

Models Good Sportsmanship Subscale:

My coach for this season…	Never	Rarely	Sometimes	Often	Very Often
1. Is a model of good sport behavior	1	2	3	4	5
2. Shows good sportsmanship	1	2	3	4	5
3. Is a role model for good sportsmanship	1	2	3	4	5
4. Is an example of a good sport	1	2	3	4	5

Prioritizes Winning Over Good Sportsmanship Subscale:

My coach for this season…	Never	Rarely	Sometimes	Often	Very Often
1. Focuses on winning more than on being a good sport	1	2	3	4	5
2. Emphasizes winning more than being a good sport	1	2	3	4	5
3. Makes winning more important than being a good sport	1	2	3	4	5
4. Focuses on winning more than good sportsmanship	1	2	3	4	5

Appendix C

Observational Tracking Forms

Game time and location:

Observer:

	Home Team: # Players:	Visiting Team: # Players:
Penalty		
Block below the waist		
Block in the back		
Chop Block		
Clipping		
Encroachment		
Equipment Violation		
Facemask – 5		
Facemask – 15		
Helmet-to-helmet contact		
Holding		
Horse-collar tackle		
Illegal hands to the face		
Pass interference		
Personal foul		
Roughing the kicker		
Roughing the passer		
Roughing the snapper		
Running into the kicker		
Spearing		
Targeting		
Tripping		
Unsportsmanlike conduct		
Delay of game		
False Start		
Illegal Formation		
Other (yds): _____ ( )		
Other (yds): _____ ( )		
Other (yds): _____ ( )		

Final Score:

Notes:

Injuries

Team/Number: Return: Y N Penalty? Y N Related? Y N What injured? Mechanism? Time of game:	Team/Number: Return: Y N Penalty? Y N Related? Y N What injured? Mechanism? Time of game:	Team/Number: Return: Y N Penalty? Y N Related? Y N What injured? Mechanism? Time of game:
Team/Number: Return: Y N Penalty? Y N Related? Y N What injured? Mechanism? Time of game:	Team/Number: Return: Y N Penalty? Y N Related? Y N What injured? Mechanism? Time of game:	Team/Number: Return: Y N Penalty? Y N Related? Y N What injured? Mechanism? Time of game:
Team/Number: Return: Y N Penalty? Y N Related? Y N What injured? Mechanism? Time of game:	Team/Number: Return: Y N Penalty? Y N Related? Y N What injured? Mechanism? Time of game:	Team/Number: Return: Y N Penalty? Y N Related? Y N What injured? Mechanism? Time of game:

Appendix D

Fair Play Penalties

Penalty	Yards Enforced
Block below the waist	15
Block in the back	10
Chop Block	15
Clipping	15
Equipment Violation	5
Facemask – 5	5
Facemask – 15	15
Helmet-to-helmet contact	15
Holding	10
Horse-collar tackle	15
Illegal hands to the face	10
Pass interference	15
Personal foul	15
Roughing the kicker	15
Roughing the passer	15
Roughing the snapper	15
Running into the kicker	5
Spearing	15
Targeting	15 + ejection
Tripping	15
Unsportsmanlike conduct	15

Appendix E

League Handbook Statement — 7th Grade

Andrew White, a University of Minnesota doctoral student in Kinesiology, is conducting a study on the impact of the "Fair Play" system in youth football. This system has been evaluated several times in youth ice hockey and has been associated with reduced penalty and injury rates. The study will begin this season with our 7th grade unlimited weight teams — one conference will use Fair Play rules this year and next year, and an additional division will begin using these rules next season.

Under Fair Play rules, teams will earn two points toward their season standings for a win, one point for a tie, no points for a loss, and can earn one additional point for staying under a certain number of relevant penalty yards per game. Relevant penalties include those associated with sportsmanship and the potential to cause injury (see the complete list below). The maximum number of relevant penalty yards a team can earn and still earn their Fair Play point for the game is 30 yards. In this way, teams will be rewarded for not only performance, but also playing within the rules of the game.

In order to carry out the program, University of Minnesota students will attend games to track penalties and injuries that occur throughout the game. Andrew will then update the league standings each Monday and Friday to reflect standings after accounting for game outcomes and penalties — coaches and area directors will have no additional duties as a result of this study. Information regarding this program has been previously distributed to area directors, and anyone with questions is encouraged to contact Andrew at the phone number or email address listed on page 2.

Appendix F

Institutional Review Board Approval Letters

UNIVERSITY OF MINNESOTA

Twin Cities Campus

Human Research Protection Program
Office of the Vice President for Research

D528 Mayo Memorial Building
420 Delaware Street S.E.
MMC 820
Minneapolis, MN 55455

Office: 612-626-5654
Fax: 612 626 6061
E-mail: [illegible]
Website: http://research.umn.edu/subjects/

September 11, 2014

Andrew C White

RE: "No flag on the play": Using behavioral modification to reduce injury rates in youth football"
IRB Code Number: **1408P52896**

Dear Mr. White

The Institutional Review Board (IRB) received your response to its stipulations. Since this information satisfies the federal criteria for approval at 45CFR46.111 and the requirements set by the IRB, final approval for the project is noted in our files. Upon receipt of this letter, you may begin your research.

IRB approval of this study includes the parent consent form and assent form received September 11, 2014.

The IRB determined that children could be included in this research under 45CFR46.404; research not involving greater than minimal risk.

The IRB would like to stress that subjects who go through the consent process are considered enrolled participants and are counted toward the total number of subjects, even if they have no further participation in the study. Please keep this in mind when calculating the number of subjects you request. This study is currently approved for 800 subjects. If you desire an increase in the number of approved subjects, you will need to make a formal request to the IRB.

For your records and for grant certification purposes, the approval date for the referenced project is September 5, 2014 and the Assurance of Compliance number is FWA00000312 (Fairview Health Systems Research FWA00000325, Gillette Children's Specialty Healthcare FWA00004003). Research projects are subject to continuing review and renewal; approval will expire one year from that date. You will receive a report form two months before the expiration date. If you would like us to send certification of approval to a funding agency, please tell us the name and address of your contact person at the agency.

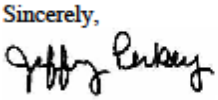
As Principal Investigator of this project, you are required by federal regulations to:
*Inform the IRB of any proposed changes in your research that will affect human subjects, changes should not be initiated until written IRB approval is received.
*Report to the IRB subject complaints and unanticipated problems involving risks to subjects or others as they occur.
*Inform the IRB immediately of results of inspections by any external regulatory agency (i.e. FDA).

*Respond to notices for continuing review prior to the study's expiration date.
*Cooperate with post-approval monitoring activities.

Information on the IRB process is available in the form of a guide for researchers entitled, What Every Researcher Needs to Know, found at http://www.research.umn.edu/irb/WERNK/index.cfm

The IRB wishes you success with this research. If you have questions, please call the IRB office at 612-626-5654.

Sincerely,



Jeffery Perkey, MLS, CIP
Research Compliance Supervisor
JP/bw

CC: Nathan Carr, Robert O'Leary, Diane Wiese-Bjornstal

UNIVERSITY OF MINNESOTA

Route this form to: See instructions below v2.0

Revised August 2015

Change In Protocol Request

Instructions:

Use this form when submitting change requests to approved IRB protocols. This form is for use when the changes are initiated by the PI. Do not use this form to respond when changes are requested by the IRB. Please do not use this form when responding to changes requested in a stipulation or deferral letter.

Submit this form to the Human Research Protection Program:

Electronic Submission:
Submit to: irb@umn.edu
PI must submit request using University of Minnesota e-mail Account.

The UMN IRB reviewed and APPROVED this submission including all attachments listed on this form by expedited review.

By Jeffery Perkey on Aug 03, 2016

IRB Protocol Information

IRB Study Number:	**1408P52896**
Principal Investigator:	Andrew White
Primary Study Title:	'No flag on the play': Using behavioral modification to reduce injury rates in youth football
Date of this Submission	7/18/2016
Study Includes	☐ Drug(s) / Biologic(s) ☐ Device(s)

Indicate the type of change(s)	Additional information/requirements
☒ Change(s) to Study Procedures/Protocol Amendment Protocol Version , Dated	**Does the change affect study design, change the study endpoint(s) or change the statistical method?** ☒ **No** ☐ Yes **Is this protocol under Masonic Cancer Center's Cancer Protocol Review Committee (CPRC) review?** ☒ No ☐ Yes, CPRC # If "Yes" is checked for ***both*** questions above, this submission (Change in Protocol form and any supporting documentation) must be reviewed by CPRC (CCPRC@umn.edu) and stamped as approved or acknowledged prior to review by the IRB. Please note that submissions not approved by the CPRC will be returned to the PI.
☐ Notice of Closure to Accrual	
☒ Recruitment changes/Advertisements	Attach a copy of the revised material (flyer, script, etc.) with the submission
☐ Revised Investigator Brochure	Version , Dated
☒ Updated consent form	Include both an updated form with changes highlighted and a "clean" version
☒ Other	Briefly Describe:The rules that award teams with a point toward standings will be modified to be more stringent and games will be videotaped periodically.

1. **Briefly summarize the change(s). For protocol amendments, do not say "See summary of changes provided with amendment." Rather, summarize the nature of the significant revisions.**

We would like to employ passive consent moving forward with this study as well as periodically video record games. Additionally, minor modifications will be made to the Fair Play program, including reducing the allowed number of penalty yards to 30 yards and subtracting a Fair Play point if teams commit over 150% of the penalty limit (45 yards).

2. **Describe the rationale for the change(s):**

The community-based nature of this project makes obtaining signed assent and consent forms very difficult, as forms must be taken home to be signed by parents and then returned at a later date. Because the questions being asked of our participants are not sensitive and are anonymous, in addition to these recruitment barriers, we would like to employ a passive consent process, which similar projects in this department have used. Participants and parents will still receive information about the study and have the option of opting out of the research. We would also like to video record 1-2 games per week so that a second observer could complete observations for the contest and provide inter-rater reliability for this project. All videos will be deleted following the second researcher's, and if necessary the PI's, review. Lastly, the rules governing the awarding of Fair Play points for good sportsmanship are being modified for two primary reasons. First, the penalty limit is being reduced in order to increase the incentive value — over 90% of the points were earned last season, suggesting the previous limit was too lenient. Additionally, teams committing over 150% of the penalty limit will now lose 1 of their existing Fair Play points — this modification comes at the request of the league commissioner in response to several instances of very poor sportsmanship last season.

3. **How will these changes affect the overall risk to subjects in this study?**

No change.

4. **Do the changes to the study prompt changes to the consent form(s)?**

☐ **No.**
☒ **Yes. If yes:**
- **Attach a copy of the revised consent form(s) with changes tracked or highlighted as well as a clean copy.**

4.1 Will currently enrolled subjects will be notified of the changes?
☐ **No**
☒ **Yes, explain below how they will be notified** (i.e. subjects will be re-consented with the updated form once approved, subjects will be provided with an information sheet, subjects will be told of changes at next study visit, etc.).

The existing participants will be present as we discuss and distribute the new forms to each team at the beginning of this football season.

5. **List and attach all documents included with this request, including version dates:**

FairPlay_consent_assent_7182016.docx — 7/18/2016 FairPlay_consent_assent_7182016_changes.docx — 7/18/2016

Appendix G

Parental Informed Consent Form

PARENTAL CONSENT FORM

Fair Play in youth football:
Using behavioral modification to reduce injury rates

Your child is invited to participate in a research study of a program designed to decrease penalty rates in order to reduce injury risk in youth football. Your child was selected as a possible participant because he/she is an 8th grade participant in the [redacted] League. We ask that you read this form and ask any questions you may have before agreeing to let your child be in the study.

This study is being conducted by Andrew White, M.A., and Diane Wiese-Bjornstal, Ph.D., of the University of Minnesota School of Kinesiology.

Background Information

The purpose of this study is to: (a) observe and describe penalty and injury rates in 7th-8th grade football, (b) investigate the effectiveness of Fair Play rules in reducing penalty and injury rates, and (c) determine if Fair Play rules are associated with changes in sportsmanship behaviors for both players and coaches.

Procedures

If you and your child agree to have them participate in this study, we would ask them to:

(1) Complete a brief set of questionnaires that ask about their demographic information, sportsmanship attitudes and behaviors, perception of their coach's sportsmanship behaviors, and football-related injuries at the beginning and end of this season. These questionnaires should take about 5 minutes to complete.

(2) Participate in their football season as they normally would. Some divisions will be using Fair Play rules, which will award additional points toward season standings for staying under a specified number of penalty yards (30) or take away points for an excessive amount of penalties (45 yards). Researchers from the University of Minnesota will attend and record games to observe and track penalties and injuries for all teams. Teams not using Fair Play rules will not be at a disadvantage for season standings. You, your child, and their coach will know if their team is using these rules before the season begins.

Risks and Benefits of being in the Study

The risks involved in this study are minimal and include potentially feeling uncomfortable with questions about sportsmanship, coach behaviors, and injuries. Questions regarding football-related injuries will address details about the injury, how the injury happened, and how long they were held out of participation as a result of this injury. Additionally, because we will connect information from this season to last season, we will need to collect identifiable information, including your child's name. Having this information does create a risk for a breach of confidentiality, but all data will be password protected and saved on a secure server to minimize this risk.

There are no direct benefits to participation in this study. However, this research may provide information that could help reduce the risk of injury in youth football.

Compensation

Your child will not receive payment as part of this study.

Confidentiality

The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify a participant. Research records will be stored securely and only researchers will have access to the records. Study data will be encrypted according to current University policy for protection of confidentiality.

Voluntary Nature of the Study

Participation in this study is voluntary. Your child's decision on whether or not to participate will not affect you or your child's current or future relations with the University of Minnesota, the [redacted] League, or their current team/coaches. If your child decides to participate, they are free to not answer any question or withdraw at any time without affecting those relationships.

Contacts and Questions

The researchers conducting this study are: Andrew White, M.A. and Diane Wiese-Bjornstal, Ph.D. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact them at the University of Minnesota, Cooke Hall, 1900 University Ave. SE. Dr. Wiese-Bjornstal can be reached directly at 612-625-5300, or through email at dwiese@umn.edu. Andrew White can be reached at 612-624-0288, or through email at whit1452@umn.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher(s), **you are encouraged** to contact the Research Subjects' Advocate Line, D528 Mayo, 420 Delaware St. Southeast, Minneapolis, Minnesota 55455; (612) 625-1650.

You will be given a copy of this information to keep for your records.

Statement of Consent:

I have read the above information. I have asked questions and have received answers. I consent to allow my child to participate in the study. **By signing below and returning this form, I indicate that <u>I do not</u> provide consent for my child to participate in this study.**

Signature of parent or guardian: _____ Date: _____

Signature of person explaining study: _____ Date: _____

Appendix H

Child Assent Form

Fair Play in youth football:
Using behavioral modification to reduce injury rates

We are asking if you are willing to help us find out if Fair Play rules help make youth football more safe. We are asking you to participate because you are playing in the [redacted] League ([redacted]) as an 8th grader this year. These rules have been helpful in youth ice hockey here in [redacted], but we won't know if they work in youth football until we try it.

If you agree to be in this study, we will ask you to complete a few short surveys at the beginning and end of this football season. These surveys will ask you about yourself, sportsmanship, and your coach's behavior. At the end of the season, instead of asking you questions about yourself again, we will ask you about any football-related injuries you had during the season. Someone from the University of Minnesota will be at each of your regular season games to watch your team and take notes, but you do not need to do anything differently than you normally would for your games.

Because we also worked with this league last year, we will need to keep your name in our private files. This program may help us learn how to make football safer for young players.

You may not want to answer some of the questions asked on the surveys. If you do not want to answer a question it is perfectly fine to skip it. Participating in this study is completely up to you and deciding to not participate will not affect your relationship with your team, coaches, the [redacted] League, or the University of Minnesota. If you ever change your mind about being in the study, just let one of the researchers know. Also, the names of players who agree to be in this study will never be used when we share what we learn from the project and your name will not be put on any of the surveys you fill out.

You can ask any questions that you have about the study now. If you think of one later, you can ask a researcher at one of your games or have your parent(s) contact Andrew White (whit1452@umn.edu).

You will be given a copy of this information to keep.

Signing here and returning this form means that you have read this paper or had it read to you and that you **ARE NOT** willing to be in this study. If you dot want to be in this study, don't sign. Remember, being in this study is up to you, and no one will be mad at you either way or even if you change your mind later.

Signature of participant: _____ Date: _____

Signature of person explaining study: _____ Date: _____